COAL AGE

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PLAYING FAVORITES

There is an old saying, "The owl thinks her children the fairest." Many mining men will quickly recognize the truth of this maxim as observed in their own lives. For those who do not, the recent experience of a certain district mine manager will make the application clear.

THIS manager had come up from the ranks. Starting in as a rodman, by sheer merit he rose from one position to another until he was placed in charge of several operations of a large company. He managed his district successfully for several years and during this period turned down a number of attractive offers from other concerns that had recognized his ability. He had dreams—every live man has them—of becoming the general manager of his company.

However, an experience befell him that dispersed the fabric of his dreams, dashed his hopes to the ground and came near putting him in the "also ran" class.

One of his superintendents was forced to quit the company's service because of ill health. The district manager wished to appoint one of his mine foremen—a capable, active man—to the position, but the general manager in the big city where the head offices of the company were located sent out to fill the job a man whom he had selected without conferring with the local manager.

To make a long story short, the new superintendent proved to be wholly unfamiliar with mining practice, such as was absolutely necessary at this mine. He was the kind of man who believed that the exercise of authority was all that was necessary to successful operation. He changed the methods of mining, and in spite of all the district manager could do he soon acquired the ill will of his men.

Matters soon progressed to the point where the local manager realized that the new superintendent was not suited to the job, but the general manager refused to concur in this opinion, defending the new superintendent and upholding his radical changes. As a consequence, the district manager, believing his usefulness in the company over and wishing to retain his self-respect, resigned his place. The big fellow down in the city, who had caused the trouble, found it comparatively easy to make his associates and the general public believe that the district manager was no longer the successful mining man he used to be.

Those who know the real character of the manager out of a job and the superintendent who was the cause of his leaving the company know very well that it is a case of the owl thinking her children the best.

IT IS NEVER FAIR *for a man in authority to let his personal liking for anyone extend so far as to believe him superior to others when the facts in the case tend to a contrary view. Likability in an individual is an important asset, but it takes something more to get results, especially in managing men and mines.*

Ideas and Suggestions

Playing Safe

By M. B. Holdstem*

Too frequently it is the case that serious accidents result because of the nonobservance of proper precautions. Too often after an accident the blame is immediately shifted onto the shoulders of the mine foreman or other official in charge of the colliery at the time, when in reality the cause is lack of observance of the principles of safety first on the part of someone else.

The miner should work his room, drive his entries and draw his pillars with the same energy, foresight and cleverness that the successful operator uses in managing and developing his properties. A slipshod, careless operator, as a rule, does not survive long in the business world if he disregards the essentials of safety first as applied to business. Likewise the miner who would rather take a long chance by neglecting to set a few props while waiting for an empty, when he knows they are needed, or who otherwise neglects his working place will never climb high in the industry he serves.

Safety first should not be sacrificed for a mere pittance. If the day's run is almost over and you have your last car nearly loaded and working under loose top, but are in a rush to get a ride out, do not hurry at the expense of your personal safety and run uncalled-for risks. Many accidents are the result of excessive speed at the wrong moment.

Not only think safety first, but observe and also talk it with your fellow workmen. Thinking but not observing ordinary precautions is not only dangerous, but criminal. A lack of caution may result in an accident not only to yourself, but also to your buddies.

Promotions Based on Merit

By Pennsylvania Reader

It is a popular fallacy, propagated by corporations and cherished by credulous employees, that the most competent men are chosen for the higher positions; that merit will receive its just reward; that long and faithful service will not go unappreciated.

Assuredly these trite phrases express the ethical considerations for promotion, the evident duty and moral obligation of the company to the individual; and no less assuredly, if they were adhered to, less friction would ensue and less bitter feeling would be engendered between labor and capital. A scrutiny, however, of the personnel of our mine managements will, with but a few sporadic exceptions, show a well-developed example of nepotism—a wanton disregard of all the laws of deontology when applied to advancement in any but the most minor positions.

Coal mining, properly so called, is no recreation; it cannot be learned at spare moments, pursued when we have nothing better to do, nor assimilated by a few months' casual observation. It has no connection with bridge parties, is no relief for the ennui of society; it cannot be absorbed wholly from books, nor undertaken half-heartedly.

When a company's policy—or lack of policy—permits the habitual introduction of men from beyond its confines to fill the higher vacancies occurring in the natural order of events, it implies the inferiority of its existing force; it discounts the consideration due length of service, for everyone must start anew with the alien appointee; the worker and the idler meet him on an equal footing; the past is nugatory; the glib talker is the proficient workman.

The acquisition of some salient ability or peculiar excellence will of course silence criticism and mollify any feeling of resentment from subordinates, but when the incumbent possesses neither experience nor aptitude, nothing to recommend him but adventitious influence, nothing to warrant the retention of his position but the decree of an arrogant management, ambition is silly, *esprit de corps* mere twaddle, organization and respect for authority absurdities.

Home Talent Often Neglected

I have seen managements bring superintendents from the sierras of Mexico and the tropics of Cuba, from the shires of England and the dutchies of Germany, find berths for a contingent from the annual exodus of their alma mater, take assiduous care of protégés of the directors, pay more attention to the bonds of a college fraternity than to years of service. Such managements show consideration to anyone but the men entitled to it, who have given the best efforts of their head and hand. As a consequence, the men who would not be underlings to inferior intelligence and heckling officialism, or be passive under undeserved pettishness, resign at the first favorable opportunity; others assume an apathetic attitude and plug ahead just as long as their monthly envelopes come regularly.

Of what avail is it to originate some labor-saving device or to develop a more efficient system of mining, when your superior has had no experience in the matter and therefore has no standards of comparison? Your good work does not matter, as you are rated by your worst output and some other man takes credit for all the satisfactory results.

The ambitious ask themselves, What incentive does the company offer me to outstrip my fellow-workman? What are the qualifications for promotion—dancing agility, ability to wear a full-dress suit and chatter inane social amenities? Must there be a friend at court to stimulate every trifling concession? Must every advancement contribute its mite to the aggrandizement of some official?

With the railroads promotion follows fixed rules of seniority, and some limiting system should be followed in coal mining, at least up to and including the superintendency. As it is, the laboring man can eat as pre-

*Akron, Ohio.

scribed by Gladstone, follow all the apothegms of Benjamin Franklin, use more mental dynamics than a New Thought disciple, and advance not an iota if he lacks social status or some ulterior assistance.

The gallery play of the company-conducted night schools and the laudatory vagaries at mining-institute meetings become insipid when never substantiated. The incongruity of the platitudes on "safety first" under the direction of a novice superintendent is apparent to anyone who has participated in a rescue party or is experienced in mining, except the managements.

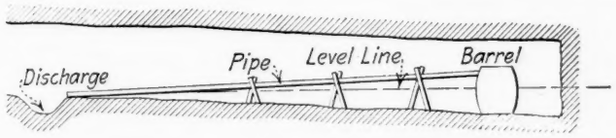
Concomitant with strike agitation, men leave mining temporarily to engage in other industries. Most of these men never return and their places are filled from inferior stock. It is a deplorable fact that no one who has labored in the mines intends his children to follow in mining; any business or employment of equal remuneration is considered preferable.

Now, in the name of common-sense, let us have equitable mine administration, with favoritism toward none; promotion on merit tempered with seniority, so mining may offer inducements on a par with the best industries; so that fathers will raise their sons to share in its possibilities, so that the laboring man can realize his aspirations in one incarnation.

Getting Rid of Room Water

By V. S. Veazey*

A practical and inexpensive way of getting rid of water in a working place where the dip is not too great is shown by the accompanying sketch. The water is bailed into the barrel which always stands full up to



ARRANGEMENT OF BARREL AND PIPE FOR DRAWING ROOM

the pipe. As the place advances, the barrel is moved and another joint of pipe added. If necessary, the barrel can be raised nearly to the roof. This scheme is neither new nor original, but may be a help to some *Coal Age* readers.

Weighing Coal on Platform Scales

By George N. Lantz†

Weighmasters at coal mines who use two-beam weigh-scales, one beam for tare and one for net, can easily dispense with the tare beam altogether and use both beams for net weight, provided the tare is obtained by finding the average weight of all cars used, which is the usual practice at mines using a single type of car.

Let us suppose the average weight of mine cars is 1,500 lb. The net weight of a car of coal can be found by balancing the scales, then weighing a car of coal, which would give a gross weight of, say, 5,000 lb. Subtracting the tare from the gross weight would leave 3,500 lb. net weight of coal. Then register the new weight in the scale beams and again balance the scales. The scales will be ready for weighing the coal net as disposal is made of the tare.

The advantage of the method lies in the fact that the weighman can weigh cars more rapidly, as he will not be required to change weights so often. For example, let us assume that the average weight of the cars of coal is 3,000 lb. and that the scales are equipped with one beam weighing up to 1,000 lb. and another weighing up to 500 lb. By the use of a 2,000-lb. counterweight, cars varying 1,500 lb. (from 2,000 to 3,500) can be weighed, while if the 1,000-lb. beam were used for the tare, the weighman would be required to change weights for cars varying 500 lb., or change weights for cars varying 1,000 lb. if the 500-lb. beam were used for tare.

With two 1,000-lb. beams he could weigh up to 2,000 lb.; with the addition of a 2,000-lb. counterweight, up to 4,000 lb. This advantage is not so obvious where scales are equipped with beams weighing up to 5,000 lb. or more, as many of them are. But on the other hand, there are many scales equipped with two 500-lb. beams.

There is another slight advantage in the method. Small quantities of light material may be weighed conveniently with a car on the platform, by using whichever beam may not be in use. If both beams are required to weigh the car, a counterweight will take the place of one of them.

In this connection it may be said that scales should be tested and balanced frequently and the platform kept clean; also that cars should be dumped clean. The small amounts that the scales might err would make little difference to the individual miner, but might amount to a large tonnage on the company side in a month's run.

It is important that scales should be exact, as the payroll is made up from scale weights and often mine weight is taken as a basis of payment from dealers. A good practice is to test the scales frequently, both loaded and light, with an occasional test at all four corners or at both ends of the scales.

Some Distinction

The doorkeeper at the works office of a big industrial plant down South has the responsibility for directing discharged employees to the cashier's window near-by.

Recently a number of men composing a yard crew were laid off, and naturally there was a scramble to reach the cashier's window first. One of the number, an Italian laborer, was making a rush for the window when the doorkeeper stopped him, saying; "Take your time, take your time." The Italian, showing evident impatience at being checked in his rush for the cashier, made this reply, accompanied by all the gestures peculiar to his kind:

"Taka your time, how is dat? When I worka in de mill wid de pick, my boss man he saya, 'Hurry up, hurry up, hurry up! but when I getta deescharge and comea to getta my mon', you saya, 'Taka your time, taka your time!' I say it'sa no good, no good!"

There is room to believe he had found a distinction.

*Glen Jean, W. Va.

†New Straitsville, Ohio.

Handling Compressed Air in Shaft Sinking

By F. D. Buffum*

SYNOPSIS—The use of a booster compressor, a simple means of eliminating water from the transmission line, an air injector for ventilating the shaft and a water ejector are described, as well as some kinks in pipe work.

Recently I took a contract for a 650-ft. concrete-lined air shaft to be sunk 3½ mi. from Boswell, Somerset County, Penn., for which compressed-air power was obtainable free at the power house in Boswell. Its use, as compared to a steam boiler plant at the shaft, would effect a saving of $5 to $6 per day in fireman's wages and about the same amount in coal. It was therefore decided to pipe air for this distance.

It was estimated that the machinery to be operated at the shaft would require a maximum of 1,200 cu.ft. of free air per minute to pump 100 gal. of water per minute from a depth of 650 ft. To provide this amount of air with an initial pressure of 100 lb. and a terminal of 80 lb. would have necessitated a 6-in. line, the cost of which would have been prohibitive.

A canvass of second-hand pipe dealers showed that there were in stock for sale or lease 10,000 ft. of 4-in. pipe, 3,000 ft. of 3-in. pipe and enough 2½-in. pipe for the remaining distance capable, if required, of carrying a working pressure of 250 lb. The line was accordingly made up of such a combination. The 10,000 ft. of 4-in. pipe has a volume of about 800 cu.ft., and in order to provide receiver capacity it was laid at the shaft end of the line. The 3-in. pipe was placed next and the 2½-in. pipe covered the rest of the distance to the power house.

A Booster Compressor Was Necessary

In order that this comparatively small line might carry the required amount of air to provide for all contingencies, a "booster" compressor was installed at the power house. This was a 16x11x11-in. Hall single-stage steam-driven machine. Its inlet was connected to the receiver of the permanent plant and its discharge into the line. With this arrangement the compressor could be cut out or bypassed when not needed and the line could then take air directly from the main compressors. Twelve hundred cubic feet of air compressed to 6 atmospheres has a volume of about 200 cu.ft. This amount of air passed through the booster and compressed to 250 lb. gage or 264 lb. absolute has a volume of only about 65 cu.ft. This volume will pass through the pipe line described with little drop in pressure.

For use in rock drills, engines, pumps, etc., not more than 100 lb. pressure was desired, and to secure this a Chaplin-Fulton reducing valve was installed at the shaft. It is regulated by weights, which can be quickly placed on or taken off to give any pressure desired, from that in the pipe line down to a very few pounds. It was found that the quantity of air required was not so great but that by raising somewhat the pressure of the permanent compressors at the power house a terminal pressure of 80 to 100 lb. could be secured at the shaft without the use of the booster. The drop in pressure in the line was a variable and depended on the amount of power being used. This is entirely analogous to the voltage variation in an electric line.

The most important feature of the plant was, however, the extraction of the water from the air so as to prevent its freezing in severe winter weather and blocking the line. This sometimes occurs in transmitting compressed air in pipes laid on the surface of the ground, as was the case in this installation. The receiver of the permanent plant was located as close as possible to the compressors, so that the air was practically as hot as when it left the machines themselves. Consequently the receiver did not extract the water, so that, to accomplish this necessary de-watering, the line was laid from the permanent receiver downgrade for about 300 ft. to the bed of a creek, thence under water for about 120 ft. and then up the bank to a receiver located close to a small power house, where men were constantly on duty who could drain it without extra expense.

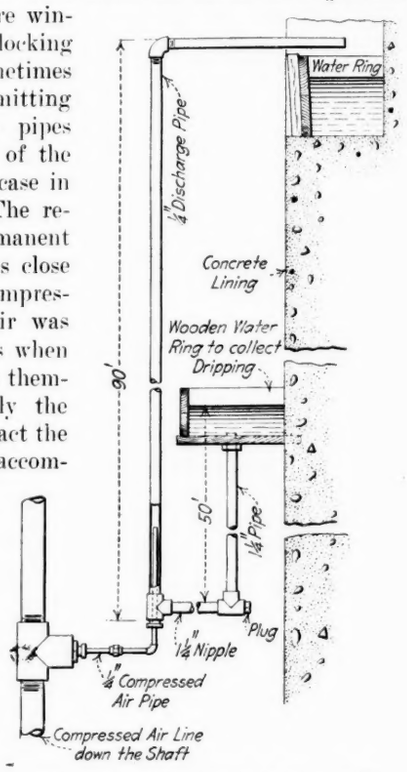


FIG. 1. ARRANGEMENT FOR EJECTING WATER FROM THE LOWER WATER RING

The air in passing from the compressor to the creek kept the line hot enough to melt snow falling on the pipe, but the creek cooled it, as did also two lengths of pipe through which it passed upward from the creek to the receiver on the bank. The air left this second receiver as cold as it would be at the shaft, and consequently it dropped all the water in the receiver that it ever would drop. There was therefore no gathering of water and freezing in the line.

The cooling of the air to make it drop its water before leaving the receiver was the whole object of this arrangement, which was designed by Mr. Hildebrand, of the Hope Engineering and Supply Co. In warm weather the creek water, being colder than the atmosphere, cooled the air. In cold weather it had also some cooling effect, though the water was not as cold as the atmosphere. It, however, kept the moisture, dropped by

*Boswell, Penn.

the compressed air as it cooled in passing from the compressors to the second receiver, from freezing because the temperature of the creek water was necessarily above the freezing point, except of course on its surface, where ice formed.

Until they were buried with a steam line beside them, so they could be warmed a little if necessary, the two lengths of pipe between the creek and the receiver gave trouble from freezing when the mercury fell below zero and a strong wind was blowing. The drain on the

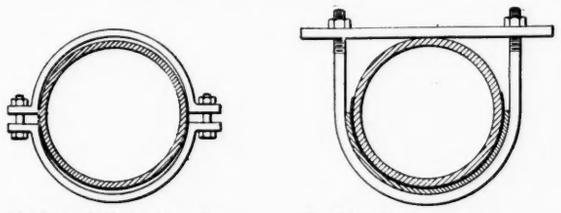

Tightening bolts tend to spring clamp away from pipe as shown exaggerated
Short length of pipe of same size as line is used placing greatest pressure over leak

FIG. 2. TWO METHODS OF PATCHING SPLIT PIPE

receiver would also freeze until a small jet of steam was allowed to play on it in the coldest weather, after which it gave no trouble.

The air delivered to the shaft was perfectly dry, and no case of freezing in the exhaust of any machinery was ever noticed except at times in a 1½-hp. automatic engine used for driving an electric lighting generator. On account of its variable cutoff and light load this machine expanded the air in its two cylinders more than did the hoisting engines, pumps, drills and engines with throttling governors. The slowing down of this unit was always an indication that the water in the receiver at the power house had not been completely drained off and that some was passing into the line.

After leaving the receiver the air line again passed under the creek, because this was the easiest way to cross it. From here the line proceeded upgrade, except for one small dip, for about 3,000 ft. to a deep hollow. It was expected that if any water got by the receiver it would lodge in this depression if given a chance; so a drip was installed there, experience with the variable cutoff engine having shown that water would occasionally get past the receiver. This was done before cold weather

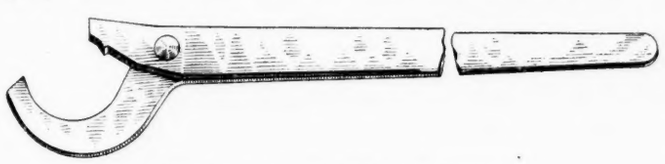


FIG. 3. A PAIR OF LAY TONGS

set in, and this precaution was taken in order to avoid any chance of freezing in the line.

The drip consisted of 18 ft. of 8-in. pipe, which formed an enlargement of the line at its lowest point. The air entered this 8-in. section from the 2½-in. pipe and expanded to fill the larger cross-section. This tended to precipitate any water which the air carried. The outlet was through a 2½-in. pipe at the far end. A small drain cock was provided at the lowest point and the whole arrangement was covered to prevent its freezing. This drain section was set so that the far end was slightly higher, allowing the water to drain back.

A few gallons of water could occasionally be drained from this drip, but the bulk of the moisture passed in a steady stream from the receiver drain at the power house, which was always slightly open for that purpose.

The machinery operated by air from the line described consisted of two hoisting engines, a concrete mixer, an electric-light engine and a shop engine (all built for steam operation), two shaft-sinking pumps, a blacksmith forge, an air-lift pump and an air jet for ventilation.

A Water Ejector Was Employed

The shaft was provided with a temporary water ring, from which there was considerable leakage, so a second temporary wooden water ring was hung 40 ft. lower. The water in it drains into a 1¼-in. pipe extending about 50 ft. vertically downward to a tee, one branch of which is plugged; the other has a nipple leading to another tee, from which another 1¼-in. pipe leads up so as to discharge water into the upper water ring. Into the bottom vertical branch of the second tee a ¼-in. compressed-air pipe enters and rises about 18 in. into the water-discharge line, which, as just mentioned, leads up from the other branch of the tee. The upper water ring is connected to a pump which discharges the water outside the shaft. This air lift was successful from the start in returning the leakage to the upper ring and pump, which was its object. The plug in the first tee was to facilitate cleaning of the line in case of stoppage.

Below the water rings there are but two pipe lines in the shaft—a 2-in. line for air and a 2½-in. for water. So little water was encountered at the shaft bottom, however, that it was found cheaper to bail it out than to pump it. Consequently the 2½-in. line was turned into a ventilating line. As is well known, compressed air does not give much relief when used to ventilate, supposedly because it is too cold and heavy to rise and carry off the gases. A horizontal length of pipe was added to what was formerly the water-discharge line at the top of the shaft so as to get an air inlet far enough away from the shaft mouth to secure pure air, and a 2-in. water ejector was attached. The steam connection of this jet was bushed down for a ¾-in. compressed-air line. When the compressed air is turned on it sucks in the pure outside air through the water inlet, mingles with it and the mixture goes down the shaft through what was the water line, making an effective ventilator, which never gives trouble. The suction of the entering air is about the same as that of an ordinary house-cleaning vacuum system.

The main use of this ventilator is in clearing the shaft of dynamite fumes after shooting. For this purpose, if necessary, steam from a small boiler instead of air can be turned into the air line; but so far this expedient has not been necessary. Steam is of course more effective in clearing away the fumes than air, but in this case its use would necessitate the firing of a boiler for this purpose alone.

A foreman and ten laborers, one of whom was experienced in oil- and gas-line construction, laid half a mile of the 4-in. power line a day, the pipe having previously been placed by teams in such a manner that all couplings were on the right end for connecting. The 3-in. and 2½-in. lines should have been laid at higher speed, but the threads were cut a trifle large for the couplings. The 4-in. pipe would have been laid faster

if it had not been for the fact that some lengths had been stuffed with rags by children. Care was of course taken to see that each joint was clean before connecting. When the air was turned into the completed line there were leaks at only three out of more than 1,000 couplings, each of which could leak at both ends if not tight. Graphite and oil was the lubricant used. These three couplings, ordinary sleeves, were then calked with lead.

Some Kinks in Pipe Laying

There were a number of places where holes had rusted through the pipe. Instead of using flat iron clamps bent to fit the pipe and bolted together, a short section of the same size of pipe split in half was clamped over the leak with U bolts and bar iron yokes. The first type of patch, which is commonly used, tends to spring away from the leak when its bolts are tightened, while the latter puts the pressure right on the leak and makes a better and cheaper patch. Of course, with either style of clamp, gaskets are required. Tar paper or pasteboard from ordinary boxes gives just as good results, at least for several months, as the highest-priced gasket material.

In laying a line of this length it is an advantage to use the regular "lay tongs" used in pipe-line construction in place of stillson wrenches or chain tongs. One size of tongs for each size of sleeve and at least two pairs for each size of pipe are required, and more would be better. For this line satisfactory progress was made with this number, in addition to chain tongs for holding the pipe section immediately adjacent to that being laid.

A jack made of a 2x4, about 4 ft. long, with one end rounded for a handle and cleats nailed near the other extremity, is an indispensable tool for holding the far end of the joint that is being screwed in place. One end of the jack rests on the ground and the other is held by a workman. The pipe rests between whichever pair of cleats circumstances require. One man is by this means able easily and quickly to raise the outer end of the pipe until the threads come fair with those in the coupling on the part of the line already laid. The pipe while resting on the jack can be easily rotated by another man so as to screw the threads in.

Irregularities Compensate Expansion

Expansion and contraction in a line of this kind are taken care of by laying it crooked. This particular line was laid in the hottest days of summer, and in parts, owing to the limited space between the highway and the property owners' fences, was not crooked enough, and as a result contracted in cold weather and rose out of some of the hollows and needed blocking up to take the resulting tension off it. All bends were made by bending the pipe cold and in place by use of crowbars in the usual pipe-line fashion.

In extending the lower end of a vertical pipe line in a shaft it is a help to have the coupling on the joint being added loose enough so it can be turned by hand. It should be as far on the joint as it is possible to turn it before any attempt is made to join the two pipes. Then when this joint is held up under the bottom of the line already in place the coupling can be turned with the fingers to make its thread catch on that of the joint above. The pipe in this case has merely to be held up instead of being both held and rotated. There is nothing new in this method, but some old shaft men do not know of it.

Extracts from a Superintendent's Diary

My brother's wife is a professional cook and food expert with a national reputation, and once each year she makes a rather extended tour of the country giving lectures on what to eat and how to cook. She has been spending a few days with us because her engagements happened to bring her near to our camp, and today she volunteered to give one of her regular lectures in our school hall for the benefit of the women of the camp, no admission being charged. Tonight, after having listened to my wife's account of what was said and how it was received, I am undecided as to just what effect the talk will have on the women who heard it, the woman who gave it and the woman who suggested it.

Our relative began by giving a list of things that ought not to be used as principal articles of diet. As my wife recalled them, the list included milk, eggs, bananas, sweets of all kinds and most meats. This list seemed to include everything that the ladies present depended upon for their husbands' dinner buckets with the single exception of biscuits, so one of the ladies in the audience asked in all seriousness for an expression of opinion about biscuits. According to my wife, biscuits and sheet lead are ranked as equivalents by the food experts and good cooks, and the question seemed so ridiculous to the lecturer that she suspected her audience might be trying to discredit her and decided to squelch any further manifestations of that kind by one supreme burst of sarcasm directed at the one who attempted the jest.

Most of the women present, as well as their husbands and the fathers and mothers of their husbands and themselves, had been raised largely on the very things that the speaker was condemning, and they were loath to accept without proof statements so much at variance with their own ideas and experience. Not only that, but the foods that they were depending upon for their daily menu were about the only things available in a mining camp; so, proof or no proof, they were not likely to make any startling changes.

My wife realized that the lecturer was getting nowhere, so suggested that the audience might be more interested in hints about cooking than in suggestions as to what to cook, but here again the speaker found little encouragement for her ideas. She started out by making a terrible assault on fried foods and frying pans in general, only to learn that miners' dinner buckets have been filled with fried foods since dinner buckets came into the world.

But she was determined to carry the adventure to a conclusion and in desperation suggested that she would be pleased to have anyone present ask questions. As the audience did not respond quickly, she reversed the tables and asked a few questions herself. The audience was perfectly willing to answer any and all questions, and it soon became apparent that there were not a dozen women in the audience who had any idea that cooking should be classed as an art. It also developed that some of the oldest women in the audience were the most ignorant as cooks. That brought the lecture to a close; how could one preach the art of good cooking as a means to longevity when most of the old women present were anything but good cooks?

Underground Mine Roads--I

By J. McCrystle*

SYNOPSIS—No definite method of procedure in the laying of tracks and switches has in the past been followed, much being left to the judgment of the foreman. If possible, the grade of the various haulageways should be such that the drawbar pull exerted by the locomotive in going in with a certain number of empties should be the same as that exerted in bringing out the same number of cars loaded.

The installation of mechanical haulage underground, its development of longer, heavier trips at relatively high velocity, the successive increases in the tonnage of the motors and corresponding changes in wheelbase, and the substitution of metal for wood in mine cars are making imperative the adoption of curves of larger radii, improved switch work and heavier rails. Already with the more progressive companies the split switch has supplanted the tongue points, the plate frog has displaced the cast frog and 50- to 80-lb. rail has replaced the 30- and 40-lb. on the main haulage roads. Patent bearings, improved oiling systems, larger diameter wheels and devices innumerable are essayed in the endeavor to reduce transportation costs.

But while skilled engineers and mechanics attest to the efficiency of the motors and rolling stock, and no expense is spared in selecting the proper track material, the all-important task of laying the track is almost invariably intrusted to the devices of an overworked trackman and the supervision of the foreman, neither of whom has more than a superficial knowledge of the subject. Because of the fact that it is possible to see only a short section of track at one time, its many irregularities and shortcomings are not realized, except indirectly in the cost of the additional power consumed, curtailed trips and frequent repairs.

Importance of Driving Uniform Curves

As the curvature of the track in mine work is directly dependent on the alignment of the sides or ribs, this in turn affecting the haulage, too great care cannot be taken to achieve a uniform curve.

With mule haulage, and the car wheels turning on a rigid axle, it was customary to drive the curves of 25 and 30 ft. radii, then in general use, by placing one leg of each set of timber a specified distance in the dark of the preceding set, and using a curve board for the track alignment. The difficulty of maintaining a line while changing the timber between the point of curve and pierhead, or "duffy set," as it is sometimes called, has caused the retention of this method by many mining men.

The offset or distance in the dark for any set is arrived at by squaring the established distance between the centers of the sets, and dividing by the radius.

Letting

D = Offset, or distance in the dark, in feet;

C = Distance in feet from timber centers;

R = Radius of the curve,

then

$$D = \frac{C^2}{R}$$

In the case of a 25-ft. radius curve, a rib radius of 20 ft. and timber placed 5 ft. between centers substituting

$$D = \frac{5^2}{20} = 1\tfrac{1}{4}\ ft.,\ or\ 1\ ft.\ 3\ in.$$

Any two sets in line on the gangway or tunnel are then taken, and a point 5 ft. from the proposed point of curve, a set is placed 7½ in. (one-half of 1 ft. 3 in.) out of line of the aforesaid two sets. Then the set just erected is adjusted to position with regard to its adjacent set, and the next is offset 1 ft. 3 in., and so on, 1 ft. 3 in. offset

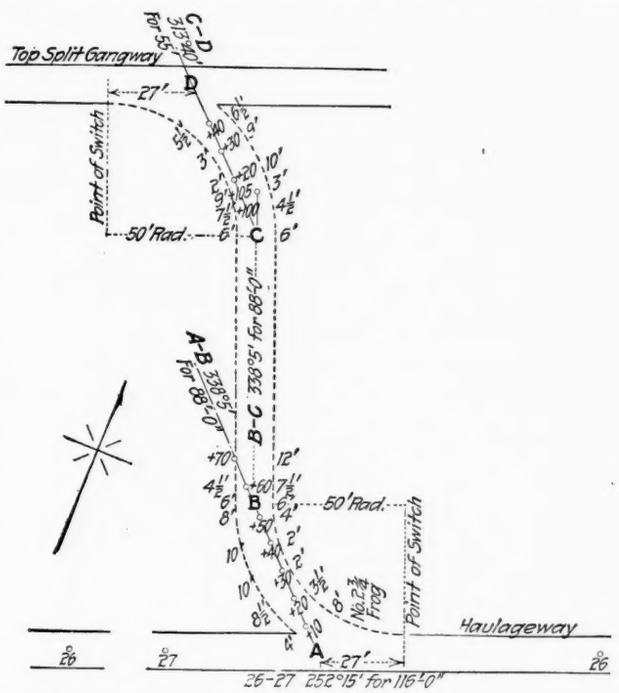


FIG. 1. LINES OF SIGHT AND OFFSETS FOR DRIVING CURVED HEADING

indefinitely until the required curve is completed. The outer rib of the curve is easily obtained from the inner rib.

As will be quickly noted, this set-in-the-dark method is but an adaptation of the center-point system in general use in the bituminous fields. The objections to it are the difficulty of standing timber exactly on line and maintaining the alignment where there is no timber, the increasing error in the event of one of the first sets being improperly placed and the compounding of the curve necessitated when connecting the track to compensate for the divergence.

Since the personnel of most mining companies now includes a mining engineer, the method of aligning curves with a transit and measuring offsets every 5 ft. is generally adopted. It recommends itself over the previous

*Minersville, Penn.

method where the radius of the curve is long, where accurate alignment is desired and where the curve is in rock.

Fig. 1 shows a typical plan for driving by this method. It will be noticed that the lines overlap, which permits setting up the transit a convenient distance from the face so as not to interfere with the drilling. The foreman will at no time be without a line. This allows a few days for any delay occasioned in receiving a new line, and the points are at a safer distance from the blasting at the face.

I have noticed on plans where the lines do not overlap that the foreman often requests points before the face

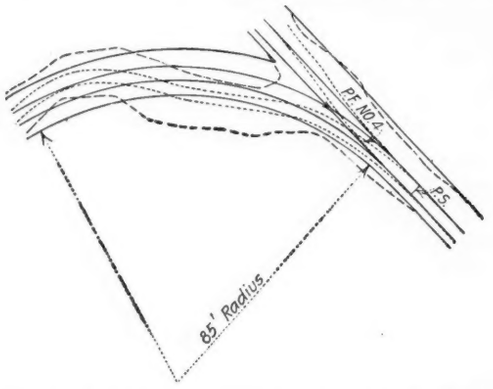


FIG. 2. A BAD EXECUTION OF A GOOD PLAN

has advanced sufficiently to permit them, two or even three trips by the engineer corps being not uncommon to give one line. This is probably due to timidity on the part of the foreman when he has only his judgment to guide him in proceeding from the limit of his last line to a distance permitting a new angle point.

Determining the Radius of the Curve

On account of the high cost of turning curves underground, the radii in general use are of necessity much shorter than on the surface. In referring to curves in this article those connecting tunnels and gangways are implied, and not those made in following the strike of the vein.

In most mines a certain radius predominates regardless of the constantly varying conditions. This is too often the smallest curve that cars will travel around without the bumpers interlocking, and is installed usually with no other considerations than that of low initial cost and a predilection for past usage.

An ideal curve would be one with which the sum of the initial cost, the maintenance during the life of the curve and the expense of haulage will be a minimum. The consummation of this ideal can only be approached by assuming several curves and calculating the costs of the several items.

Unless occurring at a site where the roof is bad or the bottom heaves, the shorter the curve the lower will be the initial cost. In estimating the expense of curves, certainly on the shorter ones the cost of the length of gangway or tunnel to reach the point attained by the larger curves should be considered.

When turning curves of larger radii the wide part of the opening just beyond the switch can be located in solid rock, thereby dispensing with the use of timber and precluding any allowance for maintenance.

As the life of curves is frequently over 30 yr. and wood timber has a service as low as 18 mo., the elements of labor and material for renewals, in addition to the risk of a derailed car knocking down the roof supports, as well as the delays in traffic incident to retimbering, must be thoroughly considered.

The use of steel timber is increasing for the long spans required in this class of work at locations where a semi-permanent job is required and no heaving or squeezing is expected.

In tunnels where the gangways to be worked lie close together a lower upkeep will be realized by turning a wing tunnel to the outer vein and continuing on the same line to the inner ones than by having a number of wide areas to maintain on the main haulageway. This also obviates the cramping of the switch work and curves which closely situated veins ordinarily necessitate.

Haulage Cost

Viewed solely from the haulage standpoint, the determining factors of the curve radius can be covered by two heads:

1. The cost of resistance due to curvature on the total estimated number of cars that can be hauled.
2. The probable number of cars to be hauled in each trip and the speed of haulage.

The amount of resistance due to curvature varies with each type of car, and to a lesser degree with each car of a certain type. This resistance expressed in terms of grade, with curves of from 30 to 100 ft. radius, will run 0.015 ft. to 0.025 ft. per 100 ft. of track for each degree of curvature. That is, with a 50-ft. radius, or 115-deg. curve, moderately clean track, fair running cars with both wheels keyed on the axle, approximately a 1.8 per cent down grade would be necessary to secure the same drawbar pull as on a tangent. The value of a curve expressed in degrees can be obtained by dividing 5,730 by the radius in feet. This formula will have to be employed especially in small radius curves; the actual arc is used to find the degree, rather than the central angle subtending the 100-ft. cord, the practice on standard-gage roads. By using the actual arc, a 50-ft. radius $= \frac{5,730}{50} = 115$ deg. curve; by using a 100-ft. cord, a 50-ft. radius $= \frac{50}{\sin \frac{1}{2}d} = 180$ deg. curve, showing a disparity of 65 deg.

Assuming a curve with a central angle of 90 deg. a ruling grade of 0.5 per cent. and allowing the same rate of resistance per degree on a 25-ft. and 50-ft. radius curve, the motor in traveling over the two would have to work equivalent to mounting a 4.5 per cent. grade for 39 ft. and a 2.5 per cent. grade for 78 ft. respectively. From the beginning of the 50-ft. radius to the point of tangent there would be a total of 1.96 ft. vertical, while to travel between the same points by way of the 25-ft. radius curve, including the 25 ft. of tangent on each end of the curve, there would be a

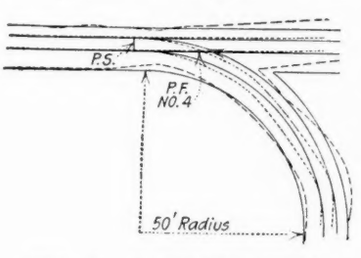


FIG. 3. A WRONG FROG IMPROPERLY PLACED

total of 2.02 ft. vertical, or essentially the same vertical rise in either case.

While actually with the smaller radius curve there would be a lower rate of resistance per degree, this would be more than balanced by the increased resistance due to the slower speed compelled by the sharper curve. If the resistance due to grade and curvature between the similarly located points is accepted as equal, then there remain in favor of the 50-ft. radius the greater speed at which the trip can travel, the reduced danger from cars jumping the track, the better adherence of trolley to wire, and 11 ft. shorter haul, and under some conditions 11 ft. less of tunnel. With a gangway producing six trips per day of twelve 5-ton cars each, this 11 ft. twice per trip would consume enough power to draw 1 ton 7,920 ft. each day, or 375 mi. per year. A self-recording dynamometer will reveal the frictional resistance of any type of car, and the monetary value per unit of haulage can be readily ascertained. In estimating the number of cars per trip, the future output, as well as the length of haul, must be considered. A haulage over which 100 cars travel per day may be increased threefold by a tunnel to the veins.

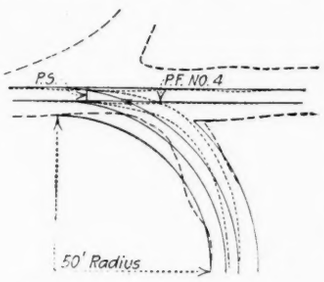


FIG. 4. ANOTHER CASE OF WRONG FROG

This will mean the installation of a larger motor if the haul is long, or possibly the use of two motors. The maximum speed of haulage underground being fixed by law (6 mi. per hour), nothing can be expected from faster transportation.

A 15-ton locomotive will not traverse curves possible to an 8-ton. machine, and this fact will demand an extra motor, with its attendant expense.

For obvious reasons no compensation is allowed for curvature underground; and if a motor is required to work at its capacity, the additional resistance to be overcome, because of curvature, will be the factor limiting the length of the trip. With the large curve a locomotive

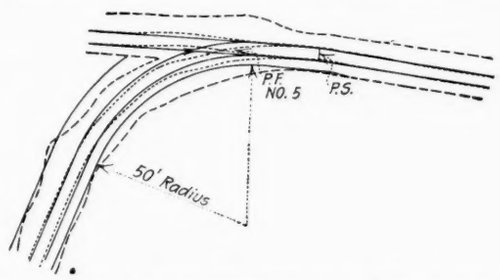


FIG. 5. A NO. 5 FROG USED IN PLACE OF A NO. 2¾

may pull through on its potential velocity, but on a curve of 25- or 30-ft. radius, the velocity will have to be reduced previous to reaching the curve.

When two curves are turned to a vein on opposite sides, the use of one 50-ft. and one 75-ft. radius has given quite satisfactory results with rapid, heavy motor haulage. The employment of unlike radii precludes the maintenance of any wide areas made imperative by the use of equal radii, and leaves sufficient space for a commodious arrangement of the frogs and switches. It also dispenses with the "crotch" or middle frog.

An inspection of the switch work at collieries where rule of thumb or the judgment of the trackman alone prevails, will manifest the wide disparity of the results under identical conditions. For frequently the trackman's sole guide is the procedure of some other trackman, who in turn is guided by some remote rule with no mathematical basis. It seems to be a proclivity of most trackmen greatly to shorten the lead and to place the frog at the nearest available rail joint. Whether this is from motives of economy or an antipathy to a little extra work or whether it is really an honest expression of what they consider an efficient job is questionable. The result is that advantages that would accrue from large, expensively constructed rock curves are nullified by the inadequate switch work and by having the track a succession of kinks.

Figs. 2, 3, 4 and 5 are actual locations of curves and switches, selected at random from several collieries where from 8- to 15-ton motors are in use. The work is typical and neither better nor worse than the other layouts at the same plants. The dotted lines show the actual location, the solid lines the intended location.

In Fig. 2 a costly 85-ft. radius curve has been spoiled by not adhering to the lines given, thereby interjecting into the track a number of wholly unnecessary flats connected by acute curves. A No. 4 frog has been used where a No. 3½ would have been proper; the lead is too short.

The entire layout has been vitiated by carelessness. It might be pertinent to remark that this curve was consid-

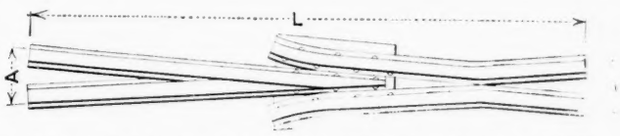


FIG. 6. ILLUSTRATION OF DETERMINATION OF THE FROG NUMBER

ered on the ground to be a fair piece of work. Its irregularities were not suspected until located and plotted.

In Fig. 3 a No. 4 frog displaces a No. 2¾, which was the proper size. As a result the frog is 5 ft. from the correct location, and the lead had to be curtailed 9 ft. to fit the rib. This curve is 2 ft. narrower than that called for by the specifications, thereby pushing the track off line and necessitating an acute curve at the end.

In Fig. 4 a No. 4 frog has been substituted for a No. 2¾, casting a sharp curve immediately beyond the frog. The lead is deficient 8½ ft. Through negligence the curve was driven off line 5 ft. and 2 ft. narrow. To the left of this curve is indicated the start of a 75-ft. radius curve to the same vein. Notice the absence of the wide opening required by two similar curves. In Fig. 5 a No. 5 frog has been introduced for a No. 2¾. In consequence the trackman had to readjust his whole layout. The switch is 16 ft. and the frog 8 ft. from their correct locations—a needless waste of 5⅓ yd. of track and a long frog.

It can be mentioned in this connection that there was no reason for the use of the wrong number frogs, as a supply of No. 2¾ and No. 3 was constantly kept in stock.

When the curve has been driven a sufficient distance to permit laying the switch, the frog, corresponding to the radius of the curve, should be placed to agree with it. Great

care should be taken to locate the frog correctly, as the symmetry of the curve depends upon it. The pernicious expedient of adjusting the frog to the nearest rail joint should not be allowed. Forty pound rails cost but 20c. per foot, and the economy of the previously mentioned practice is only imaginary.

The best practice is to designate frogs by their number rather than by their length. The number is the ratio of the length to any point divided by the spread at the same point,

Or let

L = Double or entire length of the frog;

A = Spread between the gage side of rails at one end of the frog;

B = Spread between the gage side of rails and the other end of frog;

then the number $= \frac{L}{A + B}$.

With the frog placed, the point of switch is arrived at by measuring from the point of the frog the distance found by multiplying twice the gage by the number. A No. 3 frog with a 3½-ft. gage would mean a 21-ft. lead.

If the curve is off a tangent with the radius specified and the frog number omitted from the plan, divide the radius by twice the gage and extract the square root. A 63-ft. radius with a 3½-ft. gage would require a No. 3 frog.

Connecting the Frog and Switch Points

With the frog and switch in position, a rail must be laid connecting them. To properly place this, a line should be drawn from the point of the frog to the point of the switch, and midway between these two an ordinate equal to one-fourth the gage is measured at right angles to the line. Both ends and the center of the rail have now been located and the length of rail required can be measured. If desired, additional points on the track can be located by measuring ordinates equal to three-sixteenths the gage at one-fourth and three-fourths the distance from the point of frog to the point of switch. The rail may now be bent evenly around the points thus located.

The lead for a given number frog is for all practical purposes the same, whether leading from straight track, from the inside of a curve, or from the outside of a curve. The method of ascertaining the radius when switching off curved track will be discussed later.

The plate frog affords a more lasting and easier riding connection than the cast frog, and has generally supplanted it. This may also be said as regards the split switch and the "tongue points." If for no other reason, the tongue points should be discarded as a safety measure. When approaching a turnout or curve where this type of switch is used, the trip rider is compelled to jump from the motor while it is in motion and set both points while standing directly in its path. The margin allowed him by the motorman in which to do this renders the operation hazardous. With the split switch operated by a lever placed at one side of the track, most of this risk can be avoided.

When using the split switch inside the mines, except in locations where the traffic is heavy, the switch spring is usually discarded, as it chokes with mud and becomes a hindrance. The connecting-rod between the switch points should be bolted to the flanges of the rails. If it is connected to the webs, when the treads on the locomotive become grooved the heads will be cut off the bolts.

Method of Determining Grades

The determining factors underlying grades in the mines are drainage, haulage and sometimes loading. The prevailing grade in anthracite and bituminous mines where it is possible to establish a grade runs 4 in. to 6 in. per 100 ft.

Where drainage is not the prime consideration there is a theoretic grade which can be approached, whereby the pitch of the haulage road will compensate the added resistance due to loading the cars and thus equalize the draw bar pull, when conveying either empties or loads. When a motor leaves the main turnout loaded to its capacity with empty cars it should be able to return with the same number of loads.

It is obvious that the greater the difference in weight between an empty and loaded car, the steeper should be the grade in favor of the load in order to overcome the extra resistance. Consequently, whenever a larger capacity mine car is adopted, a corresponding change in standard grade should be made for all haulages not governed by other considerations. This, however, is rarely done and the original grade is maintained. On gangways where the 0.35 per cent. grade is in vogue with cars of 3-ton capacity, the possible empties invariably exceed the possible loads.

An all-steel car (115 cu.ft. capacity—water level) empty weighs 5,080 lb. The same car loaded with coal weighs 12,230 lb. Loaded with rock it weighs 17,000 lb. These are actual weights.

Assuming the sum of the resistances due to friction and track to be 30 lb. per ton for an empty car and 25 lb. per ton for a loaded car, the coefficient of friction

TABLE 1. TOES FOR 10-FT. GRADE-BOARD FROM 0% TO 10% EVERY $\frac{1}{16}$ IN.

Per Cent.	Toe, In.	Per Cent.	Toe, In.	Per Cent.	Toe, In.	Per Cent.	Toe, In.	Per Cent.	Toe, In.	Per Cent.	Toe, In.	Per Cent.	Toe, In.	Per Cent.	Toe, In.	Per Cent.	Toe, In.	Per Cent.	Toe, In.
0.00	...	1.00	1¼	2.00	2 7/16	3.00	3⅜	4.00	4 13/16	5.00	6	6.00	7¼	7.00	8 7/16	8.00	9⅜	9.00	10 13/16
0.05	1/16	1.05	1 5/16	2.05	2½	3.05	3 11/16	4.05	4⅞	5.05	6 1/16	6.05	7 5/16	7.05	8½	8.05	9 11/16	9.05	10⅞
0.10	⅛	1.10	1⅜	2.10	2 9/16	3.10	3¾	4.10	4 15/16	5.10	6⅛	6.10	7⅜	7.10	8 9/16	8.10	9¾	9.10	10 15/16
0.15	3/16	1.15	1 7/16	2.15	2⅝	3.15	3 13/16	4.15	5	5.15	6 3/16	6.15	7 7/16	7.15	8⅝	8.15	9 13/16	9.15	11
0.20	¼	1.20	1½	2.20	2 11/16	3.20	3⅞	4.20	5 1/16	5.20	6¼	6.20	7½	7.20	8 11/16	8.20	9⅞	9.20	11 1/16
0.25	5/16	1.25	1 9/16	2.25	2¾	3.25	3 15/16	4.25	5⅛	5.25	6 5/16	6.25	7 9/16	7.25	8¾	8.25	9 15/16	9.25	11⅛
0.30	⅜	1.30	1⅝	2.30	2 13/16	3.30	4 1/16	4.30	5 3/16	5.30	6⅜	6.30	7⅝	7.30	8 13/16	8.30	10 1/16	9.30	11 3/16
0.35	7/16	1.35	1 11/16	2.35	2⅞	3.35	4 1/16	4.35	5¼	5.35	6 7/16	6.35	7 11/16	7.35	8⅞	8.35	10 1/16	9.35	11¼
0.40	½	1.40	1¾	2.40	2 15/16	3.40	4 1/16	4.40	5 5/16	5.40	6½	6.40	7¾	7.40	8 15/16	8.40	10 1/16	9.40	11 5/16
0.45	9/16	1.45	1 13/16	2.45	3 1/16	3.45	4⅛	4.45	5⅜	5.45	6 9/16	6.45	7 13/16	7.45	9 1/16	8.45	10 1/16	9.45	11⅜
0.50	⅝	1.50	1⅞	2.50	3	3.50	4 3/16	4.50	5 7/16	5.50	6⅝	6.50	7⅞	7.50	9	8.50	10 3/16	9.50	11 7/16
0.55	11/16	1.55	1 15/16	2.55	3 1/16	3.55	4¼	4.55	5½	5.55	6 11/16	6.55	7 15/16	7.55	9 1/16	8.55	10¼	9.55	11½
0.60	¾	1.60	2 1/16	2.60	3⅛	3.60	4 3/16	4.60	5 9/16	5.60	6¾	6.60	8 1/16	7.60	9⅛	8.60	10 5/16	9.60	11 9/16
0.65	13/16	1.65	2 1/16	2.65	3 3/16	3.65	4⅜	4.65	5⅝	5.65	6 13/16	6.65	8 1/16	7.65	9 3/16	8.65	10⅜	9.65	11⅝
0.70	⅞	1.70	2⅛	2.70	3¼	3.70	4 7/16	4.70	5 11/16	5.70	6⅞	6.70	8⅛	7.70	9¼	8.70	10 7/16	9.70	11 11/16
0.75	15/16	1.75	2 3/16	2.75	3 5/16	3.75	4½	4.75	5¾	5.75	6 15/16	6.75	8⅛	7.75	9 5/16	8.75	10½	9.75	11¾
0.80	1	1.80	2¼	2.80	3½	3.80	4 9/16	4.80	5 13/16	5.80	7	6.80	8 5/16	7.80	9⅜	8.80	10 9/16	9.80	11 13/16
0.85	1 1/16	1.85	2 5/16	2.85	3 7/16	3.85	4⅝	4.85	5⅞	5.85	7 1/16	6.85	8⅜	7.85	9 7/16	8.85	10⅝	9.85	11⅞
0.90	1⅛	1.90	2⅜	2.90	3½	3.90	4 11/16	4.90	5 15/16	5.90	7⅛	6.90	8 7/16	7.90	9½	8.90	10 11/16	9.90	11 15/16
0.95	1 3/16	1.95	2 7/16	2.95	3 9/16	3.95	4¾	4.95	5 15/16	5.95	7 3/16	6.95	8⅝	7.95	9 9/16	8.95	10¾	9.95	11 15/16
1.00	1¼	2.00	2 7/16	3.00	3⅝	4.00	4 13/16	5.00	6	6.00	7¼	7.00	8 7/16	8.00	9⅝	9.00	10 13/16	10.00	12

per short ton for loaded and empty cars will be 0.015 and 0.0125 respectively.

With an 8-ton motor having a rated drawbar pull of 3,000 lb. on the level, letting N = the number of cars and g = the theoretic grade for equalizing the drawbar pull, then when the motor is handling coal-loaded and empty cars:

$$\frac{3{,}000 + 16{,}000g}{(12{,}230 \times 0.0125) - 12{,}230g} = \frac{3{,}000 - 16{,}000g}{(5{,}080 \times 0.015) + 5{,}080g}$$

$$g = 5 \text{ in. per } 100 \text{ ft.}$$

With the same motor handling empty and loaded rock cars:

$$\frac{3{,}000 + 16{,}000g}{17{,}000 \times 0.0125 - 17{,}000g} = \frac{3{,}000 - 16{,}000g}{5{,}080 \times 0.015 + 5{,}080g}$$

$$g = 7 \text{ in. (almost) per } 100 \text{ ft.}$$

The foregoing is a somewhat involved quadratic equation not always easy of solution. A method which is perhaps simpler is as follows:

Let θ = Desired angle of grade to give equal draw-bar pull in both directions, then the percentage of grade, or the rise in unit length of track, is practically equal to sin θ.

If W = Weight of empty car;
W' = Weight of loaded car;
C = Cofficient of friction for empty car;
C' = Coefficient of friction for loaded car;
then $WC + W \sin \theta = W'C' - W' \sin \theta$

Substituting values in the above case

$$(5080 \times 0.015) + 5080 \sin \theta = (12{,}230 \times 0.0125) - 12{,}230 \sin \theta$$

$$76.2 + 5{,}080 \sin \theta = 152.875 - 12{,}230 \sin \theta$$

$$17{,}310 \sin \theta = 76.675$$

$$\text{Sin } \theta = \frac{76.675}{17{,}310} = 0.00443$$

Multiplying by 100 to secure the rise in 100 ft., we have 0.443 ft., or about 5¼ in.

With straight track, then, the 8-ton motor on a grade of 7 in. per 100 ft. could pull in 28 empty cars and return with the same number loaded with rock; but as the resistance of the curves, of which a major portion of every gangway consists, is a corollary of the weight, the determined grade should be augmented somewhat in favor of the loaded cars to partly compensate for curve resistance.

The value of the track resistance per ton on straight track will have to be determined experimentally for any type of car. Equipping the cars with patent bearings will have salutary effects, should this resistance prove too high.

On a recent test of nine cars, three each of the three various types ordinarily employed, on fairly clean straight track, on the surface, with cars weighing 12,230 lb. each; loaded with coal, capacity 115 cu.ft. loaded water level; wheel base, 3 ft. 6 in.; gage of track 3 ft. 6 in.; 40-lb. rail; both wheels tight on the axle; center of drawbar pull to top of rail, 18½ in.—the tractive effort required was as follows:

21.2 lb. per ton for cars with 160 deg. iron case, babbitt lined.; 10.5 lb. per ton for cars with 160 deg. brass lining; 6.5 lb. per ton for cars with Hyatt bearings.

The cars were of all-steel construction identical in every respect, except the bearings. The brass-bearing cars were new and in first-class condition, while the Hyatt and babbitt-bearing cars had been in use almost 2 yr. The results, if secured on tracks underground, in their usual dirty condition and with inferior ballast, would no doubt have been higher.

Conditions Not Always Foreseen

In the usual method of panel mining it is customary first to drive the coal gangways, and when they have progressed far enough to begin robbing, to start the rock or haulage gangway, and then tunnel, cutting off one section. This sometimes increases the length of the haulage by the length of the tunnels, and requires a proportionate decrease in the grade of the haulage. As a consequence, where the tunnels are long I have observed many haulageways with a rise of less than 2 in. per 100 ft., and the concomitant wet roadbed, choked ditch and small trip.

Another contingency not always considered in planning a haulage is that, since the abandonment of mule haulage, the loaders are compelled to move the cars at the loading chutes by their own exertions. Four cars per trip are not infrequently loaded from one chute. On the prevalent 0.35 per cent grade to move the cars the distance necessary to accomplish this would require an additional man. To dispense with this, the foreman resorts to increasing the grade immediately beneath the chutes with an equalizing diminution between them. This expedient permits loading the cars, but makes the roadbed a series of undulations with pools of water in the "dead spots." It raises the haulage cost, destroys the rolling stock and sets the cars bumping and jerking over the entire working section. It is needless to mention that a heavier grade would abate, if not wholly remove, this condition.

To be in congruity with the preceding, a grade of 7 to 8 in. per 100 ft. for the haulage and up to 8½ in. for the primary gangways would seem to have more to recommend it than the lesser grade. To be sure, the first installation of the heavier grade would reduce the available lift as the gangway advanced, but this objection would remedy itself in all subsequent levels.

Again, a ditch averaging 18 in. wide edge to edge and 6 in. deep in the center, on a 0.35 per cent. grade, would give 38.4 ft. velocity and almost 108 gal. capacity per minute, against 54.4 ft. and 153 gal. for an 8½-in. grade.

Methods of Driving to Grade

The grade may be extended by means of a grade board 100 in. long and provided with either a spirit level adjusted to the upper side, or an upright from which a plumb line is hung. The purpose in cutting the board 100 in. long is to secure an equal ratio for the various grades. For example, if the grade desired is 0.75 per cent., the board is leveled and 0.75, or ¾ in., is measured below one end. In short, with a 100-in. board the percentage of grade in feet is measured on the board in inches.

The system that is most used is to express the grade in per cent. and furnish a table (see Table 1) of "toes" for a 10-ft. board. The "toe" is the batter given the board in 10 ft. Some distinguishing mark is usually given the wide end of the board to avoid confusion on flatter grades.

Gangways should be driven on a grade whether or not any reason for it may be apparent at the time. Future developments and undiscovered geologic forma-

tions may radically change existing opinions. A system of paralleling grades will afford many possibilities and save many regrets.

The growing recognition of the importance of competent track work around mines and the inadequacy of the usual system of dealing with its many phases, as evidenced by the lack of uniformity in the results, are impelling the more progressive companies to teach the trackmen the mathematical rules and the best practice regarding it. In a number of instances this has taken the form of a book of rules and standards, analogous to the "book of rules" adopted on standard-gage roads. It is incumbent upon the trackman to familiarize himself with the contents of this book and to rigidly adhere thereto. With the track work conforming to specifications, it would be but a step to effect standard steel timber from the point of curve to the pierhead; to have on hand in the shop rails—cut, curved and drilled—that will fit between frog and switch; to carry ties in graded lengths to support both the main and turnout tracks from the point of switch to the frog, and thus secure greater stability, and eventually to obviate all delays in transportation that are usually ascribable to troubles with the trackwork.

Reason for the New Anthracite Price Schedule

SPECIAL CORRESPONDENCE

SYNOPSIS—If the price schedule were maintained unchanged, the wage increase alone would absorb all but $2,000,000 of the present profit. This amount would be far more than wiped out due to the burden put upon the coal companies by the compensation act and the rising price of powder and other supplies. Supplies which in 1915 cost about 40c. per ton of production in 1916 will cost 50 to 55c. per ton.

The agreement between the anthracite operators and their employees which was signed in Philadelphia, Friday, May 5, provides that all contract miners shall receive from Apr. 1 an increase of 7 per cent. over and above the rates in effect from Apr. 1, 1912, to Mar. 31, 1916. The same ratio of increase was given to certain other employees the length of whose working day was not reduced, and an advance of 3 per cent. was granted to the employees coming within the classification of company men the length of whose working day was shortened from 9 to 8 hr. The reduction in working time is equivalent to an increase of 12½ per cent. on the wages of the men thus affected, for with no increase in the intensity of labor the cost of production will be advanced that much either by the employment of more men to maintain the productive capacity or by a reduction in output with the same number of employees.

It is not possible to state at the present time exactly by what percentage the cost per ton will be increased by the concessions made in the agreement of May 5, but it is estimated that it will average about 10 per cent., and as the labor cost of producing anthracite before the advances were made was approximately $1.80, the additional cost for labor alone will be about 18c. a ton.

When Burden Is Placed on Prepared Sizes

The anthracite operators have endeavored to make it plain that the bulk of any advance in the selling price, made necessary by increased cost, must be placed upon the prepared or domestic sizes, as the prices of the small or steam sizes which are sold in competition with bituminous coal are regulated by the prices of that commodity in competitive markets.

The prepared or domestic sizes constitute about 60 per cent. of the total marketed output, and if all of the 18c. increased cost were placed upon these sizes the necessary advance in price would be an average of 30c. a ton on egg, stove and nut coal, at the breakers. If distributed over egg, stove, nut, pea and buckwheat, the increase is at the rate of 22.2c. per ton.

The daily press has not been slow in calling attention to the fact that the burden of this increased cost will fall upon the consumer. And not only is this true so far as the increased cost due to the wage agreement is concerned, but it is true in regard to other increased costs to which the production of anthracite is subject. The Workmen's Compensation Act has added from 5 to 10c. to the cost of the prepared sizes of anthracite; the cost of powder and other supplies have advanced in the past year even a greater percentage than the cost of labor, and these increased charges must be considered at this time in the establishing of prices.

That these or any other increases in cost of production must be added to the selling price is inevitable if the operators are to continue to serve the public. The report of the Thirteenth United States Census showed that in the year covered by its investigation the average net return to the producers of anthracite was 20c. a ton and that the earnings applicable to dividends were not more than 4 per cent., taking the industry as a whole.

Profit in 1914 Was Still Only 20c. per Ton

Statistics compiled for the subcommittee on wage negotiations by the Anthracite Bureau of Information show that the average returns per ton on the anthracite production in 1914 were practically the same as in the census year—namely, 20c. a ton. The marketed product in that year was 72,383,579 tons, the total net returns on which at 20c. a ton would be $14,475,000, or about $2,500,000 more than would be added to the cost of the production by the increased wage cost created by the 1916 agreement.

This small margin would be more than wiped out and a good-sized deficit created, if the increased cost of supplies are added and no advance made in the price to the consumer. The capital invested in anthracite mining is entitled to a fair return, as is capital invested in other enterprises. Considering the hazard involved, there are

few lines of industrial endeavor where the returns on the investment and on the energy put into the business are smaller than they are in anthracite mining.

The Philadelphia & Reading Coal and Iron Co. on Monday, May 15, announced its schedule of prices, effective May 1, and the other operating companies are expected to follow the Reading's lead, which announces an advance of 15c. on egg coal, 40c. on stove, 20c. on nut, 40c. on pea and 15c. on buckwheat No. 1. Applying these figures to the production of these sizes as reported by the United States Geological Survey in 1914, we have for every 100 tons of coal produced the following:

Size	Tons	Increase	Total Increase
Egg	12.37	$0.15	$1.856
Stove	20.59	.40	8.236
Chestnut	23.03	.20	4.606
Pea	11.75	.40	4.700
Buckwheat No. 1	13.42	.15	2.013
Total	81.16		$21.411

WHAT A CHIPPED NICKEL MUST BE MADE TO DO

That is, for every hundred tons of coal sold 81.16 tons would consist of the domestic, pea and buckwheat sizes, and a total increase on this quantity of coal would be $21.41, or at the rate of 26.38c. per ton. This is only 4.2c. more than the wage cost per ton distributed over these sizes, and all of this, and more, is absorbed by the added expense due to the increased cost of explosives and other supplies. These have advanced to such an extent that in the Schuylkill region, where in 1915 the average cost of materials was about 40c. a ton of production, the increased cost in 1916 will be from 10 to 15c. a ton.

The producers of anthracite are not desirous of advancing prices, but when the cost of production is increased there is no other recourse. Anthracite has no monopoly of the household fuel trade. It is in sharp competition with gas, oil, coke and bituminous coal. It is, therefore to the interest of the producing companies, in order to hold their trade, to furnish anthracite to the consuming public at a price as reasonable as consistent with cost of production and a fair return on the investment.

Production of Lignite in North Dakota

State Engineer Jay W. Bliss, Bismarck, N. D., who is also ex-officio state coal-mine inspector, has completed his annual inspection of the lignite operations in that state. He reports that the output of lignite for the year 1915 was valued at $922,586, the production for the year being 586,704 tons.

Burleigh County, through the large plant established at Wilton, leads in production, with Ward, Divide and Stark Counties following in the order named. Merchant mines are operated in 18 out of the 52 counties of the state. Mr. Bliss reports that there have been no labor troubles at any of the mines during the year 1915.

Meeting of M-O-I Association

Arrangements have been made for the most important convention in the history of the M-O-I Association, to be held at Cedar Point, Ohio, Aug. 1, 2 and 3. G. A. Boecking, president of the Cedar Point Resort Co., will welcome the association, followed by a response from Robert Lake, president of the organization. Reports will be read by the president, secretary and treasurer, showing the progress and financial condition of the association. Ben R. Vardaman, associate editor of the *Merchants' Trade Journal*, Des Moines, Iowa, will talk on "The Retail Dealer's Place in the Community," and A. M. Hull, editor of the *Retail Coalman*, of Chicago, Ill., will speak on "Dignifying the Coal Business." On Aug. 3 Dr. Stanley L. Krebs, of Philadelphia, Penn., will talk on "The Secret and Pull of Suggestion in Advertising, Coal Salesmanship and Business Building," and a representative of the Federal Trade Commission will speak on the work of that commission, after which the election of officers will take place. An interesting entertainment program is promised.

West Virginia Unrest Ended

News comes from Grafton, W. Va., that the unrest is practically at an end. The men have been granted a 5 per cent. increase, which is half of what they at first demanded. But as it is the second increase within the year the men are satisfied, and have good reason to be.

Thomas Haggerty, Sam B. Montgomery and J. A. Springer, who represent the miners in the section which threatened to strike on May 15, declared on the day following that there was no likelihood of a strike. The Fairmont region was quiet because it had been the first to grant the increase. It had done this voluntarily. Only one mine in the Flemington region on May 16 had not signed up, and it was expected to sign on that day.

Mr. Haggerty declared that the entire West Virginia Northern R.R. district of Preston County had granted the 5-per cent. increase sought and that Newburg and Tunnelton had likewise satisfied the miners' demands. One or two mines around Austen had not at that time signed the new scale, but it was expected that an agreement would be reached that day.

COMING MEETINGS

Meeting of Anthracite Section of the A. I. M. E.—The annual meeting of the Anthracite Section of the American Institute of Mining Engineers will be held at Wilkes-Barre, Penn., June 10, 1916. Members will meet at 2:30 p.m. at the Lehigh & Wilkes-Barre Coal Co. building, and drive to the Loomis Colliery of the Delaware, Lackawanna & Western Railroad Co. After inspecting the colliery—which is nearly ready for operation—the members will return to the Westmoreland Club for an informal dinner at 6 p.m., costing $2 per plate, after which there will be reading and discussion of a paper on "Anthracite Stripping," by J. B. Warriner, chief engineer of the Lehigh Coal and Navigation Co.

The American Mining Congress will hold its 19th annual session during the week beginning Nov. 13, 1916, at Chicago, Ill.

American Society of Civil Engineers will hold its annual convention at Pittsburgh, Penn., June 27-30.

Illinois and Wisconsin Retail Coal Dealers Association will hold its next annual convention on July 26 and 27 at Madison, Wis.

Byproduct Coke Producers' Association of America, formed in Chicago on Jan. 14 last, will hold its first annual meeting in Boston, Mass., on July 14, lasting probably two or three days.

Canadian Retail Coal Association's annual convention will be held on board boat touring the Thousand Islands on June 14 and 15. Secretary, B. A. Caspell, Brantford, Ont., Can.

Michigan-Ohio-Indiana Coal Association will hold its annual convention at Cedar Point, near Sandusky, Ohio, Aug. 1, 2 and 3. Secretary, B. F. Nigh, Columbus, Ohio.

Pennsylvania Retail Coal Merchants' Association will hold its twelfth meeting, June 20-22, at Harrisburg, Penn. Secretary, W. M. Bertolet, Reading, Penn.

Rocky Mountain Coal Mining Institute will hold its next meeting at Salt Lake City, Utah, June 14, 15 and 16. Secretary, F. W. Whiteside, Denver, Colo.

The Mine Inspectors' Institute, U. S. A. will hold its ninth annual meeting at Joplin, Mo., Tuesday, June 13, 1916. Secretary, James W. Paul, Pittsburgh, Penn.

Who's Who--In Coal Mining

Charles M. Means

When one thinks of electricity and its application to coal mining, one's thoughts immediately turn to C. M. Means over in Pittsburgh, who knows a lot about electricity and just as much about coal mining. Mr. Means as a consulting engineer has carved out for himself an enviable reputation in the coal fields of the Eastern states. His experience in his special line of engineering work is unusually broad and covers in a practical fashion all the varied problems connected with the use of electric current in mine development.

Mr. Means is a native of Pennsylvania, having been born in Punxsutawney in 1869. At the age of 23 he took up industrial and coal-mining electric work, start-

C. M. MEANS
Consulting Electrical Engineer, Pittsburgh, Penn.

ing in a subordinate position and devoting several years to the accumulation of worth-while experience. In these early days he availed himself of the opportunity to study railway and electric-light practice, working on a number of important problems that were based on advanced ideas, as electrical practice at that time summed up.

In 1900 Mr. Means become affiliated with the Rochester & Pittsburgh Coal and Iron Co., his attention being directed entirely to electrical coal-mining work. In 1912 he started in consulting work, associating himself with Harry F. Randolph, the firm name being Randolph-Means Co. The business of the new engineering company prospered greatly, and the concern has handled many difficult engineering problems.

Mr. Means is at the present time consulting electrical engineer for the United States Bureau of Mines, electrical engineer for the Department of Mines of Pennsylvania, and in addition is employed by several other state governments and legislative committees as an advisory engineer in the matter of formulating rules and laws governing methods of mine operation and equipment at coal plants.

He is treasurer of the Randolph-Means Co., is a member of the American Institute of Electrical Engineers and of the Engineers' Society of Western Pennsylvania. Few men are cutting a deeper swath in the engineering end of the coal-mining business than C. M. Means, of Pittsburgh.

Attacks Use of Belt Dressing

When a belt is not running smoothly, the operative usually smears some belt dressing on it, frequently with the aid of a stick, and then rests satisfied with the consciousness of a duty well performed.

The use of belt dressing should be abolished, says F. B. Prescott, in *The Anode*, because it is unsafe, unnecessary and wasteful. The great bulk of belt dressing used is applied while the belt is in motion, and the accidents from this cause are neither few nor slight. It is the easiest thing in the world for a man putting dressing on a moving belt with a stick to have his arm drawn into the machinery with serious consequences to himself.

If belts and pulleys are properly designed and adjusted, they do not require belt dressing for their smooth operation. When the pulleys are clean and the surface of the belt becomes polished through operation, we have an ideal drive.

The first waste as regards belt dressing is its cost. When placed on the belts it causes them and the pulleys to pick up dirt and dust, which build up on the pulley, change its cone, decrease the belt and pulley contact and frequently cause the belt to slip or run off the pulley. It is therefore wasteful from the standpoint of efficiency. When used on belts running on paper pulleys, the rosin and grease in the dressing cause the belt to stick to the pulley and strip the paper from it, this destruction being out of all proportion to the legitimate wear and tear which a company naturally expects.

Some men may hold different opinions on this matter, but it is a remarkable proof of the position as outlined that no belting firm of standing will recommend belt dressing of any kind (with the solitary exception of a little light oil to keep the belts soft and pliable under special local conditions).

After many years' practical experience we know that the consensus of opinion among leaders of the profession is that the manufacture of belt dressing is, in itself, economic waste. We know full well that the manufacture of the article cannot be stopped by any safety department, but the next best thing is well within the province of a management, namely, to prohibit its use entirely, relying upon clean belting and pulleys for efficient working, rather than upon apparatus choked up with dressing and dirt, which needs more dressing to keep it running.

A New Coal Pier at Charleston, S. C.—With the departure of the steamer "Pleiades" from the Southern Railway's new export coal terminal at Charleston for Buenos Aires, loaded with 5,000 tons of Clinchfield coal, the first actual step has been taken in the development of what may be a large traffic in coal between South America and the southern coal fields. The railway company has erected a new coal terminal for handling this business which embodies the most modern facilities. Coal is dumped directly into a hopper from which it is fed into the holds of ships by a belt conveyor and a telescopic chute, insuring the most rapid handling and eliminating the breakage.

Handling Retail Coal in a Concrete Cylinder Plant

By Charles H. Higgins*

SYNOPSIS—Routing coal from New Jersey terminals to New York City. Construction of the plant shows many interesting new departures from the usual practice. General operation. Coal-hoisting machinery. Power plant.

A large concrete retail coal-handling plant, shown in Fig. 1, has just been built at the foot of East 19th St., New York City, the owner being O. H. Perry & Son, Inc. Its capacity for unloading coal from barges is at the rate of 2 tons per min., which amounts to more than 1,000 tons in a working day.

Coal for use in Manhattan is dumped into boats or barges of 250 to 500 tons' capacity at the railway terminals along the New Jersey side of the North River and at Perth Amboy, N. J., and towed to bulkhead walls on Manhattan Island. When the coal barge is pulled alongside the bulkhead of the Perry plant, under a boom which is 100 ft. above the barge, a grab bucket of 1½ tons' capacity, swinging from a trolley on the boom, hoists the coal 90 ft. vertically. The trolley is pulled in horizontally, and the coal is dumped into a hopper just below the heel of the boom, the entire movement being controlled by an operator standing in the house alongside the hopper. From the hopper the coal flows by gravity through a system of steel chutes to any selected one of 13 concrete bins or pockets. One of these pockets is for bituminous coal; the other 12 are for storing the different "steam and prepared sizes" of anthracite, of which there are at least six to be handled.

The coal is directed by means of gates to any pocket desired. These gates are arranged so as to be easily operated from the floor of the engine-boiler room. In addition to directing the flow of coal to the proper pocket the fireman who operates the gate may direct the coal into either one of two bunkers which are located on the boiler-room floor and from which he conveniently obtains coal for firing the boiler.

As the bins or pockets are 40 ft. deep, the breakage in the larger or "prepared" sizes would be excessive. To prevent this, flow ladders are provided in the pockets where the larger sizes of coal are to be stored. These flow ladders consist of a series of baffles, through which the coal passes without acquiring excessive momentum.

To take the coal from these storage pockets, trucks pass through the driveways beneath the concrete platform on which the pockets are supported, and the truck driver, by opening a gate numbered to correspond with his instructions, allows the coal to flow over a screen into his truck. The screenings, or dust, fall through the screen into the dust bins, which are located between the columns on each side of the driveways. This truck is driven over granite-block pavement to one of two platform scales below the second story of the office building, the first story being omitted for part of its length, to make room for these driveways with scales. The weight is read on the first floor of the office building on a scale beam, near a window overlooking the scale platforms. If the order is for a definite weight, the weight is corrected from small "off and on" pockets above the scales and directly under the second floor of the office. After the coal is weighed and the truck has driven off the scale, the coal may be sprinkled from a water pipe and sprinkler extending out from the office at such height and location as to permit trucks to drive under.

The accumulation of screenings in the dust bins and all sweepings of the yard are dumped into the elevator

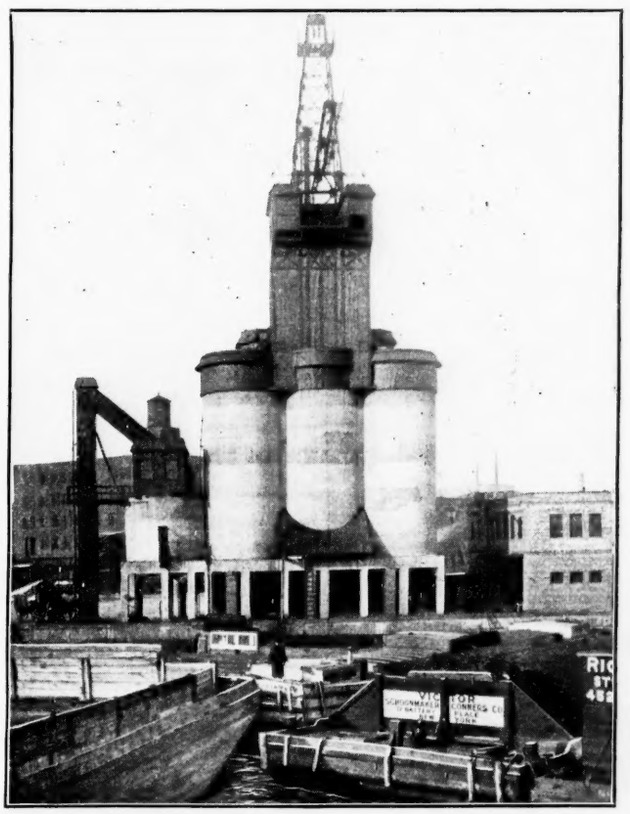


FIG. 1. EAST RIVER FACE OF THE NEW PERRY COAL PLANT; BARGES IN FOREGROUND

boot near the southeast corner of the plant and hoisted by a bucket elevator to the rescreening house, where the coal flows into a revolving screen that separates it into five sizes and drops each size into a separate bin of the rescreening pockets. The bucket elevator and screen are driven by an electric motor. The dust—that is to say, the coal passing a ⅜-in. screen—falls into the low cylinder pocket nearest the river, from which by a chute and gate it may be slid into an empty boat, be hoisted by the main grab bucket and passed into a bunker on the engine-boiler room floor, where it is available for firing the boiler. The other low cylinder is divided into four pockets by diaphragm walls, and the coal is drawn off into a truck by gates located in the bottom. There are similar overhead gates in the bottom of the dust

*Consulting Engineer, 30 Church St., New York City.

bin, from which the dust may be drawn off into trucks. As already stated, coal may be deposited in the pockets and drawn out at the rate of 2 tons per min. The capacity of the pockets (some 2,500 tons) represents the storage capacity and allows for keeping a supply of each of the different sizes on hand.

After careful examinations of the merits of different methods of hoisting and of moving coal horizontally to the different pockets the method determined upon was to erect a steel tower, about 90 ft. high, supported and anchored to the concrete cylinders. The tower was designed to support a 42-ft. horizontal boom with the heel seated about 40 ft. from the top of the tower: also to support a steel hopper with an opening in the top about 10 ft. square, located at the front of the tower and about 15 ft. below the boom. By means of an ordinary clamshell bucket and trolley operating on the horizontal boom, coal might be dug from boats lying alongside the bulkhead and dumped into the hopper.

The method chosen for distributing the coal from the hopper to the various bins was by a system of chutes 24 in. wide and 18 in. deep, of rectangular cross-section and made up of steel plates and angles. Considerable difference of opinion arose as to what angle of slope such chutes should be given in order that coal of the different sizes handled might flow freely and, at the same time, with not greater speed than necessary. This problem was somewhat complicated by the fact that several turns were necessary to take the coal from the hopper to the bin, as can be seen on the drawing. An average angle of 37° was finally determined upon, the angle being made somewhat greater for the first two-thirds of the distance to the bins and a corresponding amount less for the remaining third. No difficulty has been experienced, the coal flowing freely.

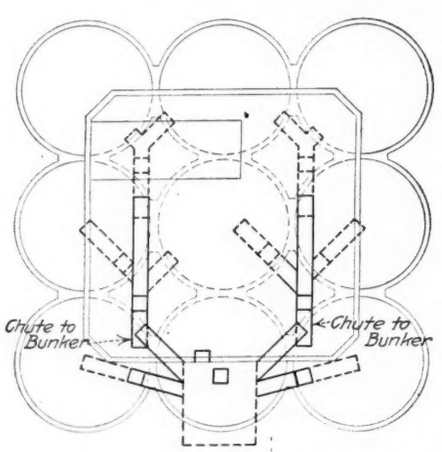


FIG. 3. LAYOUT OF CHUTES

A baffle with a slide gate, located at the bottom of the hopper, directly above the beginning of the chute system, permits regulation of the size of the opening from the hopper to the chute system. By this means a great surge of coal is avoided when the bucket dumps.

The gates in the chute system are of the flap type and are so arranged at change of direction points that in opening the chute to one bin they close the chute to another. Some slight adjustment proved necessary to adapt these gates to the conditions, but they are now working very satisfactorily. The chutes are covered by light steel plates, fastened in place with bolts for most of the distance, to prevent coal from flying about.

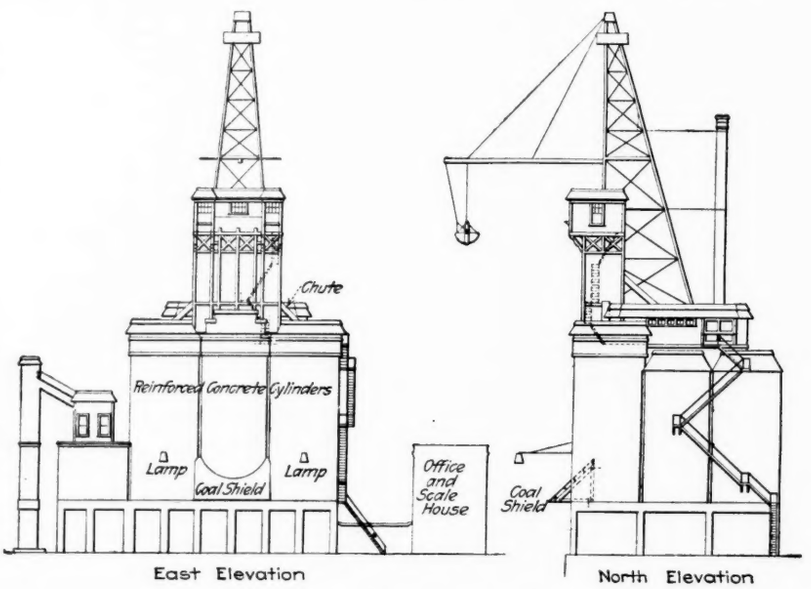


FIG. 2. HEADHOUSE OF COAL-HANDLING PLANT

The bucket is operated by a double-drum double cylinder hoisting engine near the end of the tower and above the coal pockets. A second engine, superimposed on the first, is provided to operate the carriage, which is also properly counterweighted. A horizontal fire-tube boiler was installed to supply steam for the hoisting engines.

The engines, trolley and bucket are provided with complete control, so as to be precisely and conveniently operated by one man standing in the control house alongside the hopper. To carry the engines and appurtenances and to distribute the load and brace the structure, a floor of steel I-beams was constructed at an elevation 7 ft. above the top of the concrete pockets, as indicated. On the I-beams was cast a reinforced-concrete slab 5 in. thick, provided with hatches and gratings to give access to the pockets below. At each of these hatches and gratings there is a wooden stairway, and below, at the level of the pockets, are plank runways to give access for trimming, etc.

The rescreening plant consists of a concrete waterproofed boot with bucket elevator, of a capacity of 15 tons per hr., operated by a 7½-hp. motor in the screenroom. The same motor operates a 42-in. locked, crimped steel-wire, revolving screen 20-ft. long, with four partitions that divide the coal into five sizes. When screened, the coal chutes directly into the pockets of the rescreening plant.

The Perry plant was designed by the writer and was erected under his supervision, with Ralph H. Perry acting for the owner. The coal-handling machinery was furnished by the Guarantee Construction Co., New York City.—*Engineering News.*

Induction-Motor Characteristics*

By H. M. Phillips

SYNOPSIS—A discussion of the speed limitations, the starting current and torque of the squirrel-cage motor, and the advantages of the wound-rotor type for certain kinds of service.

In spite of the large number of induction motors now in service, comparatively few operating engineers are familiar with their characteristics. Most isolated plants operate on direct current, but with the increase of central-station service has come greater use of alternating current and the induction motor.

In selecting the squirrel-cage motor for any specific purpose, one is first confronted by the limited choice of speeds. Although it is generally preferable when buying a direct-current motor to accept one of the standard speeds offered by the manufacturer, it is little trouble to obtain one that runs at any desired speed; after installation one may increase the speed to a considerable extent by means of a field rheostat or decrease it by means of resistance in the armature circuit, although the latter procedure is generally objectionable. No such latitude is possible with the squirrel-cage motor.

Most alternating-current circuits operate at 60 cycles, thus fixing the maximum speed for which the motor can be designed at 3,600 r.p.m., which is too high for ordinary purposes; only such lower speeds are obtainable as can be derived by dividing this figure by an integral number, giving 1,800, 1,200, 900, 720, etc. It is seldom practicable to go below the last figure, the use of which is generally confined to large motors. A smaller number of circuits operate at 25 cycles, with a corresponding reduction in motor speeds, and an extremely limited number operate at 50 cycles or other odd values. The foregoing are "synchronous" speeds, practically those at which the motor will run on no load; when fully loaded, the "slip" will reduce the motor speed from 2 to 8 per cent. below these values.

This lack of flexibility in speed is not without its advantages. The shunt-wound direct-current motor invariably increases its speed with its temperature. This accession may be as high as 15 per cent. during the first few hours after starting up. The speed is also subject to minor variations in the adjustment of the brushes and in some poorly designed motors it advances slightly with increase of load. Changes in line voltage also produce variations in speed, and if the change is sudden, there are violent current fluctuations which may throw the circuit-breakers.

Although these faults do not prove serious in practice, they are entirely lacking in the squirrel-cage motor—it cannot run away, there is a predetermined variation between no load and full load, and the ordinary variations in temperature and in line voltage have no perceptible effect on the speed. Variations in frequency, which can be produced only by variations in the speed of the generator from which the power is obtained, will produce corresponding variations in speed, but these are rarely of serious magnitude.

*Published in "Power," p. 682, May 16 issue.

The ability of a shunt motor to handle an exceptionally heavy overload of a short duration rests in the commutator and brushes. There may be violent sparking, but no great reduction in speed until an arc forms across the commutator, blowing the fuses or doing more serious damage. No very accurate data are obtainable as to the amount of overload that may be safely carried in this manner. A modern motor should be able to stand at least twice the rated load, and it is probable that some will stand four times full load for a few seconds. If the load is suddenly applied and is greater than the motor can carry, it is likely that serious damage will be done before the fuses have time to blow; the circuit-breaker gives better protection, but even that sometimes fails.

Under similar conditions there is a more clearly defined limit to the pulling ability of the squirrel-cage motor; few will fail at less than double load, while some will carry three times full load or even more. These figures do not differ materially from those of the shunt motor; it is the manner of failure that is of greater interest. Up to the limit of its strength the squirrel-cage motor suffers a small reduction of speed and may become slightly noisy, but gives no other sign of trouble. Having reached the limit, it quietly gives up, relaxes its pull and comes to a standstill where it will still exert some force, but materially less than it did while running. If the motor is of small capacity, say 10 hp. or less, it may stand for half a minute with full voltage on its terminals without being damaged by the heating of its windings; which should give ample time for the fuses to operate. The maximum pull that the motor can exert while running is termed the "pull-out torque," and it is customary for the manufacturer to guarantee that it will be a certain number of times the full-load torque.

To the operator of direct-current machines a stationary motor connected directly across the line is practically the same thing as a short-circuit; and serious damage, either to the motor or elsewhere, can be averted only by the almost instantaneous operation of the circuit-breaker. The squirrel-cage motor, when so placed, may take from four to six times the full-load current, which, however, is quite different from that of a short-circuit.

Direct-Current Motor Starting Under Load

In starting a heavy load the direct-current motor has a decided advantage; with a controller designed for the work in hand it can be accelerated as slowly as desired and can be made to exert a starting torque several times that required at full load, which is sometimes of importance in overcoming the static friction of a very "dead" load. With the ordinary hand starter the direct-current motor will exert about one and one-half times full-load torque at the moment of starting. Moreover, the motor requires but twice the full-load current to give twice the full-load torque while starting, and the same proportion holds for other values. The ordinary squirrel-cage motor will exert only from once to twice full-load torque in starting even if it be thrown directly across the line, and will probably require a starting current of from two and one-half to five times full-load current to exert a starting torque equal to that required at full load.

Although a change in voltage has less effect on the speed of a squirrel-cage motor than on a direct-current motor, it has a greater effect on its ability to handle heavy loads. A moderate reduction in voltage, say 10 per cent., will probably not reduce the ability of a shunt motor to start or carry an excessive load by more than 5 per cent.; it will have no effect at all on the series motor other than to reduce the speed. With the squirrel-cage motor both the starting and the pull-out torques vary as the square of the voltage, so the reduction of 10 per cent. in voltage would give a reduction of 19 per cent. in torque. As the drawing of heavy currents is likely to reduce the line voltage, this point is of some importance.

No one would think of starting a 1-hp. shunt- or series-wound direct-current motor by throwing it directly across the line; even if the motor withstood the current, the shock would probably be too great for the machine it was intended to drive. Yet squirrel-cage motors up to 5 hp. are invariably started in this manner, and 10-hp. motors frequently are. If the fuses are of sufficiently low capacity to be of much benefit, they are pretty sure to be blown unless the squirrel-cage motor comes up to speed quickly; for which reason a double-throw switch is frequently used in starting. With the switch in position for bringing the motor up to speed, the fuses are cut out of circuit; when speed is attained, the switch is thrown over, bringing the fuses into the circuit. If the switch is so arranged that it is necessary to hold it in while in the starting position, there is no danger of the motor being left running without fuses.

Starter Necessary with Larger Motors

With the larger motors it becomes necessary to use a starter, as much to protect the line from excessive currents as for the protection of the motor itself. Starting is effected by reducing the voltage on the motor, thus cutting down the maximum current. If the motor is to be reasonably strong in starting, this reduction cannot be very great, as the current is reduced in direct proportion to the voltage, while the starting torque is reduced as the square of the voltage. Thus if the motor will give a starting torque of one and one-half times full-load torque on full voltage and it is desired to start with full-load torque, it will be necessary to apply 82 per cent. of full-load voltage. This will bring the motor up to very nearly full speed, so there is no necessity for a number of steps such as are used with a direct-current motor; and as soon as the motor approaches full speed, it is thrown directly across the line. Resistance is sometimes inserted in at least two and preferably three of the wires leading to the motor, but in most cases transformers are used; these are preferable, as they reduce the starting current in the line to a value less than that required by the motor. These transformers are generally supplied with connections for several different voltages, so that if the motor is always to start under a light load a lower starting voltage can be obtained. Even with transformers the fuses are cut out while starting.

From the foregoing it will be seen that the ordinary squirrel-cage motor is not well-adapted for service that requires frequent starting and stopping, a high starting torque, a considerable time for acceleration, or suddenly applied loads. Certain classes of work performed on the hand screw machine or small engine lathe require only a few seconds for the actual cut and hardly more time to place a new piece in the chuck, the machine being started and stopped at each operation. Some large planers have their feed operated by a direct-current motor that is started and stopped with each stroke. The heavy starting current required by the squirrel-cage motor would cause it to overheat on such work. Conveying machinery that has been stopped while loaded, or a reciprocating pump working against a low head, may require double the full-load torque to start; and unless the motor is much larger than is required to carry the running load, it will be unable to start.

A centrifugal machine or any machine with a heavy flywheel may require a rather heavy pull to start and must have considerable time in which to come up to speed. Supposing the typical squirrel-cage motor to be thrown directly across the line under such service, it may exert one and one-half times full-load torque in starting and at the same time take five times its rated current; as it gains speed, the torque will increase and the current diminish, but when the motor is within 3 per cent. of its full-load speed it will still be taking twice its rated current. This heavy current, prolonged for the time necessary to bring the flywheel up to speed, is likely to produce undue heating of the motor. With direct current a compound-wound motor is generally used on shapers and planers and on machines equipped with flywheels, in order that there may be a slackening of speed with the sudden increase of load, giving opportunity for the flywheel to give up its stored energy or for the parts to be accelerated without too great an expenditure of energy. The squirrel-cage motor, with its small change of speed with load, will be subjected to a heavy overload at each stroke of the planer or at each operation calling for the expenditure of flywheel energy.

Changing Squirrel-Cage Motor Characteristics

All the troubles previously noted can be at least partly overcome by increasing the resistance of the squirrel cage itself—that is, the rotor. The increase of resistance may be accomplished by reducing the cross-section of the end rings, by making them of a composition of higher resistance than copper or by using a metal of higher resistance for the bars themselves. To alter the section of the bars would introduce the necessity of thicker insulation or a change in the size of the slots. Increasing the rotor resistance reduces the current that the stationary motor will take at a given voltage and at the same time increases the starting torque; it also slightly reduces the pull-out torque, but the change is generally so small as to be of little consequence. It likewise slightly reduces the full-load speed of the motor and increases the variation of speed produced by a given change of load. The difference between the synchronous speed and the full-load speed, expressed as a percentage of the former, is termed the "slip" and measures the loss of power in the rotor, being closely analogous to the slip of a belt. If the high-resistance rotor increases the slip from 4 to 7 per cent., the motor will have lost 3 per cent. in efficiency.

Where the squirrel-cage rotor, even with high resistance, fails to produce the desired results, a "wound rotor" may be used. Here the rotor carries a winding somewhat resembling that of a direct-current armature except that in place of a commutator there are three rings (in the case of a three-phase motor) to which three sets of exter-

nal leads are connected by brushes. These leads have no connection with the line currents, but resistance introduced between the terminals has the same effect as increasing the resistance of the rotor, with the advantage that it can be varied by a controller to suit the requirements of the service. By its use a starting torque equal to full-load torque can be obtained with a current only slightly exceeding that required while running at full load; with a lower resistance the starting torque may be made equal to the pull-out torque with a proportional increase of current.

For machine tools requiring to be driven at different speeds, the induction motor offers no very acceptable substitute for the shunt-wound motor with field control. The introduction of the wound rotor causes a loss of efficiency on low speeds and gives a wide variation of speed with changing load. Two speeds are sometimes obtained by the use of two windings, really combining two different motors in one, but the performance sometimes fails to be satisfactory. Motors with commutators, generally single-phase, are sometimes used for small powers, but fail to show all the desirable qualities of the three-phase motor.

The operator on first acquaintance with induction motors may be surprised to find that they take from one-quarter to one-half full-load current while running at no load. This does not mean that they require the same proportionate amount of power, but merely that they have a low power factor; the actual power will rarely exceed 10 per cent. of full load and may be considerably less. In most cases this is of little importance, but if a large number of such motors are kept running light for a considerable part of the time, a generator must be provided with sufficient current capacity to supply this relatively high no-load current. Under full load the power factor is usually from 80 to 90 per cent., which fact also must be considered in calculating the current capacity of the generator.

In speaking of induction motors, the stator winding is often referred to as the "primary" winding and the rotor winding as the "secondary."

It Can Be Done

Somebody said that it couldn't be done,
But he, with a chuckle, replied
That, "Maybe it couldn't," but he would be one
Who wouldn't say so till he tried.
So he buckled right in, with the trace of a grin
On his face. If he worried he hid it.
He started to sing as he tackled the thing
That couldn't be done—and he did it.

Somebody scoffed: "Oh, you'll never do that;
At least no one ever has done it."
But he took off his coat and he took off his hat,
And the first thing we knew he'd begun it.
With the lift of his chin, and a bit of a grin,
Without any doubt or quiddit:
He started to sing as he tackled the thing
That couldn't be done—and he did it.

There are thousands to tell you it cannot be done,
There are thousands to prophesy failure;
There are thousands to point out to you, one by one,
The dangers that wait to assail you;
But just buckle in with a bit of a grin,
Then take off your coat and go to it:
Just start in to sing as you tackle the thing
That "cannot be done"—and you'll do it.

—Cullen Barge Corporation.

Anthracite Contract Prices

After considerable delay and indecision, somewhat similar to the announcement of the new price circular, the contract prices on the broken size for furnace use and the steam coals were given out last week. While it had been accurately forecasted in *Coal Age,* the trade was nevertheless somewhat surprised that a new size, "boiler" coal, had been added to the steam coals.

The contract prices are as follows:

Broken	$3.50	Rice	$1.00
Pea	*2.80	Boiler	.90
Buckwheat	1.50	Barley	.75

*Contract price for pea is the same as circular, and in the months when the selling price by reason of the discount, as in the present month, is lower than the contract price the lower price will apply.

Another innovation was the statement that all contracts will be made for the year ending Mar. 31, 1917, placing the anthracite contract business on the same basis with bituminous thus abandoning the long-standing custom of contracting for the calendar year.

Owing to the fact that one of the large companies made three different contract quotations during the week the trade was quite unsettled. In the first announcement the figures were those given here. These prices had hardly been in circulation for twenty-four hours when the quotations on rice and barley were hurriedly withdrawn by phone.

Then on Saturday morning the trade was again informed that another arrangement had been made and the original prices would stand. It is practically certain now that the prices are actually fixed.

There is much speculation as to just what the new boiler size will be like, standing as it does between rice and barley. Inasmuch as there is only a price difference of 10c. between rice and boiler, the supposition is that they are much the same. As a matter of fact dealers who cater to steam coal business for customers who do not have railroad sidings, immediately arrived at the conclusion that they could use the new boiler size as rice without any explanation to their customers. Certainly by mixing the two in their yards, by dropping a car of each size in their bins, there would be very little difference.

It should be stated that all the companies have not announced the new size, but it is altogether likely that the lead of the larger companies will be followed, as has been the case for many years. However, some of the companies have announced that they will not have any barley for sale, the inference being that the barley will be distributed through the other steam sizes. This has been done by some concerns for several years past.

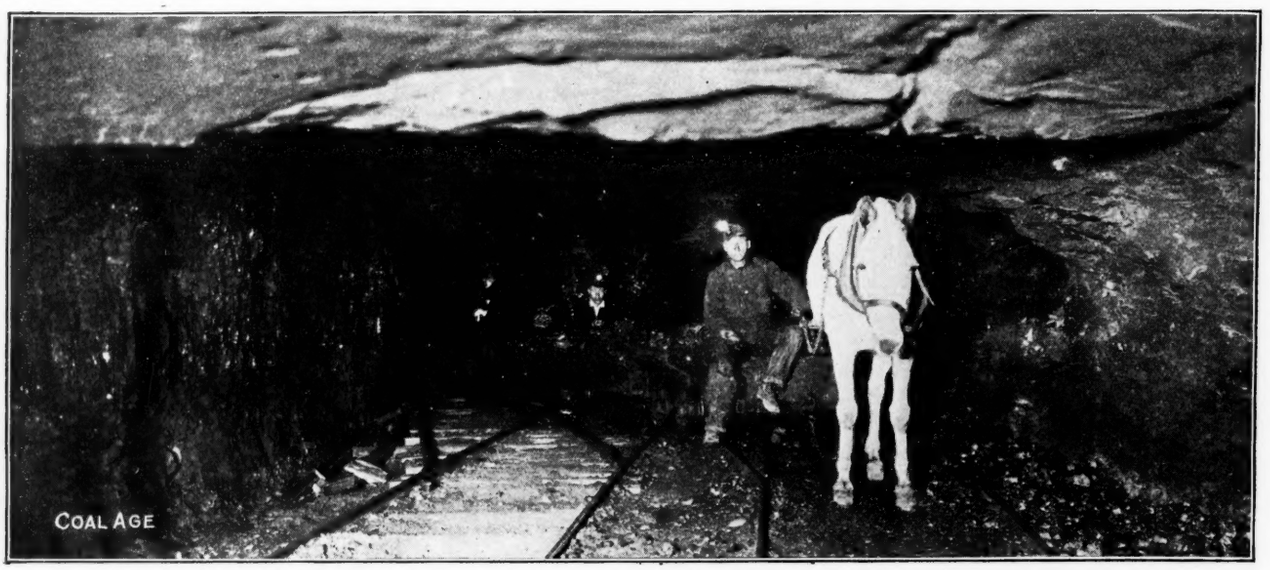
With the new contract prices now out it is interesting to compare them with the prices ruling over the period from 1910 inclusive to date:

	1910	1911	1912	1913	1914	1915	First Quarter, 1916	May 1, 1916. to Mar. 31, 1917
Broken	$3.00	$3.00	$3.00	$3.00	$3.25	$3.25	$3.25	$3.50
Pea	1.75	1.75	2.25	2.25	2.25	2.25	2.30	*2.80
Buckwheat	1.25	1.25	1.25	1.25	1.25	1.25	1.40	1.50
Rice	.65	.65	.85	.85	.85	.85	.90	1.00
Boiler	...	...	...	...	...	...	...	.90
Barley	.35	.35	.50	.50	.50	.50	.55	.75

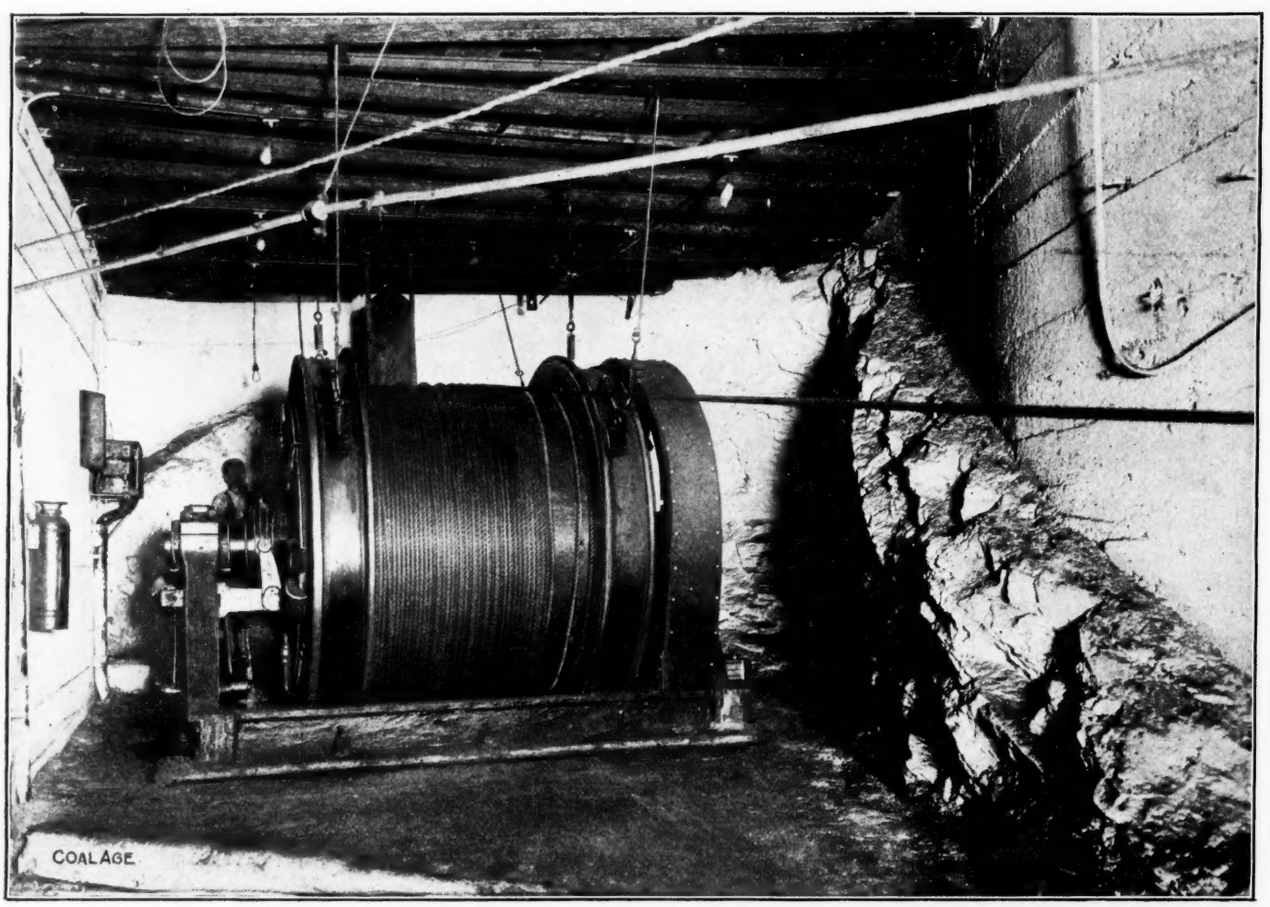
*40c. reduction for May.

It is to be understood, of course, that these prices cover the popular or white-ash grades. On such limited or special grades as Lykens Valley, etc., the prices vary from the foregoing table.

Snapshots in Coal Mining



VIEW IN MINE NO. 48, CENTRAL COAL AND COKE CO., GIRARD, KAN.



NO. 6 SLOPE HOIST, AUCHINCLOSS MINE, D., L. & W. R.R. CO., SHAFT NO. 1

The Labor Situation

General Labor Review

The anthracite region is gradually settling down, and some say the result of requiring the contract miner to work till the whistle blows is having a beneficial effect on the tonnage obtained. If so, the 8-hr. clause in the contract will gladden the heart of every contract miner's wife.

A force of 50 deputies and 25 state troopers was on hand when the union miners went back to work at the Jermyn shaft and Old Forge breaker on Monday, May 29. It was necessary to have a sufficient show of force to convince the Industrial Workers of the World that it would be useless for them to interfere.

The strike still continues around Pittsburgh, and the operators will probably refuse to meet the scale committee of eight men which has been appointed to make a new agreement with them. They contend they made a valid contract with the mine workers' leaders. The miners claim it violates

Courtesy of "Life"

THE PICKPOCKET—"LIFE'S" IMPRESSION OF THE ANTHRACITE SITUATION

the McAlpin agreement—a sort of constitution limiting the powers of all who try to enact any subsidiary legislation.

So long as the miners venerate that constitution—the McAlpin agreement—there ought to be no difficulty, for the operators surely will stand by it, and if they can be brought to realize that the house rent, household coal and powder rates violate it, they will undoubtedly correct them.

As many other sections, if not all, have agreed not to increase the cost of at least some of these requisites, it should not be hard for the Pittsburgh region to do so, even though it is somewhat harder hit by the present wage scale than other coal regions. Probably the 25 per cent. of the union miners still at work at the beginning of the week will now go on strike.

It appears that in eastern Ohio arbitration is not dispensed with, though the board of three operators and three mine leaders which replaces the old arrangement seems only to promise a series of deadlocks for which an umpire is required. Perhaps there will be a broad policy shown which will make the six men impartial judges, but former wage disputes seem to justify the idea that some of them will not be anything else than advocates of the point of view of others. However, it will be seen later if the plan will work.

The trial of the suit of President Howat against the coal operators at Kansas City is at last proceeding, but Hazen, the principal witness for the defense, is absent, no one appears to know where.

It was stated in a Scranton, Penn., paper that John P. White would not be a candidate for the presidency at the expiration of his term next fall. He has telegraphed President John T. Dempsey of District No. 1 that there is no authority for the statement.

The English-speaking miners do not seem to favor White for president, and there is so much dissatisfaction that some anticipate that an effort may be made by the anthracite miners to break away from the United Mine Workers and form a separate organization. It is indeed hard to weld together the miners in all parts of the country into a harmonious whole.

Frick Coke Co. Wage Increase

The increase of wages of the H. C. Frick Coke Co. has much to do with the discontent in the Pittsburgh region. The rate is accepted by practically all the operators in the Connellsville, Lower Connellsville, Upper Connellsville and Greensburg-Connellsville districts. The rate for mining is over double that in force in 1894, and the miners are to be congratulated on the fact that without a union such large increases have been secured.

The action of supply and demand has proved as strong as the work of the union. It is doubtful whether the last increase will produce the number of men who are needed in the coke region or prevent the men from leaving for the munition works.

Indiana Strip-Pit Agreement

The strip-pit miners in Indiana are trying to make an agreement with their employers. They have demanded that all-day labor in or around strip mines be paid the same wage, except, however, blacksmiths, haulage engineers, tractor drillers and machinists.

They demand a 15-per cent. increase in wages, an 8-hr. day for everyone, including blacksmiths, overtime allowance at one and one-half times the regular scale, double pay for Sundays and holidays, working places kept in as dry a condition as possible and a restriction of the work of running a steam shovel to cranemen of at least 2 yr. experience and of the work of cranemen to foremen of 2 yr. experience.

They also demand that the "oilers" in the old contract be termed in the new agreement "oiler firemen" and that they be placed on a monthly scale and receive the wages of firemen, that all day laborers shall have an equal division of work during a suspension either local or general, that where an extra shift is being worked and the company sees fit to put more on the day shift, the oldest man or men on the night shift shall be given day work and that the new man or men be put on the extra shift.

They also require that tipple firemen be hired by the month, as are steam-shovel men, and while providing that they may be obliged to work every day except Sundays and holidays they require that on these occasions the firemen and hoisting engineers shall take these days in turn. Clem Richards was elected chairman of the meeting and William Mitch, secretary.

The strip-pit operators refuse to grant the scale, demanding that the men live up to the New York agreement. President Edward Stewart says that the McAlpin contract has no validity as regards strip-pit negotiations. There is much to be said in favor of the contentions of both sides.

Late in the afternoon of May 18 the arrangement of a new contract was left to a committee of three men from each side.

Strike in Pittsburgh Region

The difficulty in the Pittsburgh region is based primarily on whether the new conditions are or are not violations of the McAlpin agreement. Where they do not attempt to annul that contract the conditions must be accepted as binding.

The miners appear to have tried to exercise duress on the operators and the operators tried the same trick, with the result that the latter actually won in the struggle. As a matter of fact the mine workers and operators should have realized that it was almost a moral impossibility in the "interstate" area to make new contract provisions this year except in so far as the McAlpin agreement provides for them.

Good Example Furnished by Indiana Miners

In Indiana an exchange of concessions was proposed, but when the mine workers demurred there was nothing to do but accept the old Terre Haute conditions in their entirety. The Indiana mine workers very creditably refused to strike, as they could not do so without violating the McAlpin contract, to which they were bound. They might condemn that contract and abuse the labor leaders, but they were not permitted to strike because their word was pledged against such an action.

Now in the Pittsburgh region, until the local settlement was made, a strike was clearly wrong. However, one cannot feel it was not justified after the labor leaders had made a settlement that in effect vetoed some of the provisions the operators had signed for and which the miners had in mind when they voted for the agreement. If the miners now ask for more drastic provisions than can be secured by the former agreement as modified by the McAlpin contract, they should be severely frowned on by the public.

Rent, Coal and Powder Were in Old Contract

But changes in the price of house rent, coal, powder and caps should not have been made. They are not ordinary articles of merchandise, for house rent and coal were placed in previous scales, and the requirement was also made that "where new or permissible explosives are used the company shall furnish them to the miner at the same cost per ton of coal produced as black powder."

The prices in the company stores are not rightfully matters to strike about unless indeed they are unfairly raised. They form no part of any previous agreement and, moreover, the increase granted in the McAlpin agreement was demanded by the miners because living rates were raised. Now, if they were not raised, why were wages increased?

The strike has steadily spread until at the opening of this week about 75 mines, in the valleys of the Monongahela and Youghiogheny, and 16 mines in the Panhandle district were idle. It is estimated that from 70 to 80 per cent. of the total tonnage capacity of the union mines has been suspended by the strike.

The details of the miners' demands are very complicated, including points as to rents, prices in company stores, etc. The malcontents wish to repudiate their local officials. A district convention was called for Wednesday, May 24, and the convention met and adjourned from day to day until May 29 without accomplishing anything tangible. Several of the national officials were in attendance, apparently for the purpose of supporting the local officers of the union.

The operators insisted that they had carried out the wage agreement and that if for the purpose of restoring peace they should make even minor concessions, beyond the requirements of the agreement, men in other districts would be tempted to strike for extras and chaos would result.

Girl's Hymn Singing Results in Short Truce

Some of the events in the convention have been quite dramatic. On May 26 the miners became much angered when Robert Woods declared that there would be no morning session on Saturday, the day following. Several hundred men crowded around him making threats, declaring that the delay was a trick of the union officials to outmaneuver the men.

Woods was being severely jostled, when Miss Luna Ashford, of Uniontown, one of the convention's stenographers, sprang to his side and pleaded with the miners to let him go. He was finally allowed to leave the hall, but disorder broke out again and the irrepressible Miss Ashford walked to the piano and began playing a hymn: "There is sunshine in my soul today." The men joined in the singing and the meeting ended in a song festival.

But on Monday the accusations were as bitter as on Friday. President Van Bittner declared: "I never thought members of the United Mine Workers of America would accuse me of insincerity. So far as I am concerned, the Pittsburgh Coal Co. or other coal companies have no strings on me."

Miners Ask Operators To Make New Contract

On Tuesday, May 29, the mine workers by a unanimous vote rejected the wage scale recently signed in New York City and adopted a resolution providing for the election of a committee which would confer with operators in the district to obtain a new agreement. A motion was made to remove the district officials, but it was ruled out of order amid much confusion.

The miners declare the increases in rents, powder, caps and coal amount to approximately 15 per cent. and make it impossible to make as much money as under the previous agreement. All such statements are false, and the miners know it. It is disgraceful that there should be a disposition so grossly to misrepresent the facts.

The strikes started after the men had received a large pay, and the convention has developed no definite information as to how serious their intentions are. It is conceivable that the mine workers may be induced to go back to work within a few days on the operators' terms. Nevertheless there is a possibility of the strike spreading farther, and in some quarters it is thought there is danger of some of the nonunion miners going out, especially in the Westmoreland field.

No Reduction in Earning Power Permitted

It is to be hoped that the operators will agree to all the McAlpin contract demands—to wit, that no reduction in the earning power of the men shall be permitted as a part of the operation of the new contract and that the miners will use no coercion to get more than that, because they are surely not entitled to anything further. It is pleasurable to find that the mine workers and operators of the Middle West have set an example that the Pittsburgh mine workers and operators can well copy.

Van Bittner is an honest man and a capable leader, and doubtless he believed he was doing what was right when he signed with the operators. The miners rightly think differently, but if they believe the McAlpin agreement can be virtually rewritten by their duress they need to be brought to thir senses by a severe jolt.

It is a hard saying to declare that the Pittsburgh district which was discriminated against at the interstate conference should be further injured by being compelled to sell powder, explosives, caps and coal at a loss. But there is the McAlpin agreement to meet, and, right or wrong, the Pittsburgh operators must accept their medicine with all the unpleasantness it entails. If they don't like it they should have withheld their signatures when the recipe was in the making. They failed to do this and then tried to make good by a duress which the contract forbade. They will have everyone's sympathy if they submit, everyone's condemnation if they treat the McAlpin agreement as a mere "scrap of paper."

Indiana Faithful to Contract

Operators affiliated with the Indiana Bituminous Coal Operators' Association and representatives of District 11 of the United Mine Workers of America have settled all negotiations for a contract with new working conditions by turning again to the old Terre Haute agreement for a period of two years. Of course, this contract is modified, as far as the wage scale is concerned, by the provisions of the McAlpin agreement. The end of the joint convention came after both organizations had fought for a recognition of their views.

The agreement known as the "Old Terre Haute Agreement" is that under which Indiana miners have been working. On the final day of the joint convention some of the miners' delegates were frankly outspoken for the old agreement and favored its readoption, while there were a very few who thought that the mine workers should strike in an effort to force the operators to accede to their demands.

Most Miners Believe It Is Wrong To Strike

From the start of the joint convention it was made plain by the operators that they were willing to exchange concessions, but in an executive session of the mine workers this offer was refused. The men were bound by the New York agreement to follow the old contract unless changes were made which were mutually agreeable to both organizations.

When the subject of striking was considered President Edward Stewart of the mine workers declared that the international organization would not permit it, and also that he would not advise such a serious step. A resolution that an ultimatum be presented to the operators was voted down on the floor of the convention.

Miners Want No More McAlpin Agreements

Delegate McCune brought the negotiations to an end by presenting a motion that the miners accept the old agreement under protest. The motion was carried and the "Old Terre Haute Agreement" will continue in force for two more years.

Editorials

That Clonic Spasm of the Eye

Pardon a personal question, but do you have a clonic spasm of the eyeball? Most of us would like to meet a man who has. Frederick L. Hoffman, statistician for an insurance company, has written Bulletin No. 93 for the Bureau of Mines, and says that the English (surely it should rather be the British) experience indicates that "a possible, if not the probable, number of persons employed in American coal mining and afflicted with nystagmus totals 2,228 for the year 1913.

"These rates," he adds, "are unquestionably conservative, for they are far from the 5 per cent. of ascertained cases for certain mining districts in Germany. If the proportion of American coal-mine employees affected with nystagmus were as high as 5 per cent., the number of such cases estimated for the year 1913 would be 37,382."

So the question is a fair one. Have you nystagmus—that is, a clonic spasm of the eyeball? Are you one of 2,228—or should it be 37,382?—American victims of that dread disease? No one, as far as our editorial experience goes, has ever seen a nystagmatic man in the American mines or out of them in America. So where are the 2,228 or 37,382 unfortunates who have the disease and are hidden away like prophets in a cave? Mr. Hoffman assures us that if we paid them as does Great Britain and its labor employers we should, at the rate of $70.22 a year, have to give the unfortunates $156,450 per annum.

Judging, however, from the fact that these people have been obliged to hide so that no one can find them, $70.22 would appear to be a beggarly compensation for clonic spasms of the eyeball. A total disability compensation—to be paid if the victims could be found—would be no more than reasonable. This would mean at least $300 a year, and if we are as well supplied as the most favored part of Germany—and who will dare deny it?—it will cost us $11,214,600 every 12 months. There is nothing remarkable about that figure; any man who is possessed of the three R's can calculate it. The trouble you will have with it is not to calculate it but to believe it when calculated.

The sane and genial Van H. Manning, in his preface to the bulletin of Mr. Hoffman, very wisely anticipates doubt. He says: "Possibly American physicians and mining engineers will doubt that many American coal miners are afflicted with nystagmus," and indeed to most mining men who do not read foreign journals the disease and the symptoms are wholly unknown.

Nystagmus is a real affliction. It is not likely that it is a mere figment of the imagination or a scheme to get compensation. But it does not follow that it has appeared or will soon appear in American mines.

It has suddenly taken hold on the miners in Europe. True it is that Shufflebotham in 1914 stated that it "was first recognized by Gillett about 1854, although no case was mentioned in medical literature until 1861." But as the description of the disease as given by Gillett is not reproduced in the bulletin, perhaps after all it was not a true case of nystagmus. Like the author of the report we are considering, he may have seized on some matter like that from Thackrah published in 1832 in which it is said:

> The complexion of the colliers, even after the removal of the dirt, is sallow and unhealthy. Their eyes, from the swelling of the lids, appear small, are affected with chronic inflammation and intolerant of full light. . . . Sickness and vomiting sometimes affect persons at their commencing the employ; and many after a few years' trial are obliged, by the injury which their health has sustained, and especially by the weaknesses of their eyes, to leave the mine.

All of which is not a description of nystagmus, or even of conditions common in mines in this country under the present practices in mining. Mr. Hoffman does not claim it as an evidence of an early prevalence of the disease, though he puts it in such a position that one might be justified in thinking that he desired it to be so regarded.

Perhaps Shufflebotham is disposed to believe that the disease is ancient and in establishing a pedigree he may have let imagination run riot. Whether that is so could only be established by quotations from the earliest authorities, and this the bulletin does not vouchsafe to us. The literature on the subject seems to take form in 1894 with Nieden's monograph on the subject. At that time he found that 4.03 per cent. of the 7,500 miners he examined had nystagmus, so the disease must have made great inroads.

As suggested in an editorial which appeared in this periodical on Jan. 31, 1914, it is quite probable that nystagmus is a disease arising from a germ like tetanus or from a worm like ankylostomaisis. If so, the matter is one for a bacteriologist or a helminthologist to study. As the hookworm found a chilly reception in the shallow American mines and could not germinate "with its teeth chattering," so perhaps the bacillus or nematode, or whatever it is which causes nystagmus, finds our temperate mines as unfavorable as is the temperate climate of Pennsylvania for the propagation of the anopheles mosquito and the hookworm.

There are some puzzles to be met. Thus the disease is said to be found on the surface among workers in other than the coal industry, though the spasms in daylight workers may have a wholly different cause. In this connection it is interesting to note that the claim that the disease is found in other than coal miners is not generally accepted.

Moreover, it is absent from metal mines, though these are deeper and even warmer than the British coal mines. However, the advocate of a germ or worm theory as an explanation of nystagmus has less difficulty in satisfying himself than does the man who believes with Snell or with Court that eyestrain of some kind is the cause of the trouble. For the admittedly debatable argument in favor of the germ or worm theory reference can be made to the editorial in *Coal Age*, Vol. 5, pp. 211 and 212.

By Mutual Consent or Duress?

The anthracite agreement, when signed, needed nothing but interpretation, and but little of that. The McAlpin contract, on the other hand, had in it clauses which made further agreement necessary. It prescribed that these changes, apparently only in matters not arranged in the contract, should be made "by mutual consent."

Now of course if both operators and miners were convinced that a change in the rules were advisable, or at least admissible, then by mutual consent the rules could readily be changed. But this condition rarely if ever occurs, and the worthy framers of the McAlpin contract did not believe such a unity of sentiment would be found to exist when they penned that euphemism "by mutual consent." Had they tried to express their real meaning they would have said that changes in the existing contract provisions should be secured by mutual duress.

Duress is of various kinds. The mine workers can strike, they can threaten a suspension, they can work on public sentiment and they can agitate for laws which will hamper the operator. Apparently in many places, eastern Ohio among others, the threat to suspend the operation of the mines was the method used.

By this means the mine workers succeeded in obtaining a local agreement in which the provision for arbitration was diluted. The operators put up a long fight, but at the last minute they gave way. They were suspicious that "consent" would be employed against them. They seemed to have a craven fear of its application.

On the other hand, to produce that "mutual consent" the operators could lock out their men, they could delay the operation of the new schedule of wages by refusing to sign the contract, they could buy their coal at non-union mines, they might even conceivably appeal to public opinion. The operators in the Hocking Valley, if we do not mistake the indications, won out by laying their mines idle and obtained a contract wherein it was decreed that the coal must be loaded in cars without impurity, that the coal face must be snubbed before the coal is shot down, that strikes must not occur except against defective scales or in cases of failure to pay wages on the proper day, that fines will be levied for all strikes violative of the contract and that all differences be submitted to arbitration.

A few of the operators in the Pittsburgh district tried the second form of duress. They refused to pay the increased wage for mine work prescribed by the McAlpin agreement until the final or subsidiary contract was completed.

The miners were sure of their increased wage, sure of having it apply on all labor performed for the operators on and after Apr. 1; but they were in a hurry to get the whole matter settled as soon as possible, for they felt doubtful of the good faith of the firms that employed them.

They went on strike for the days they remained idle, losing not only the increase to be given under the McAlpin contract for which they were so solicitous, but also the whole day wage. This strike made the union officials nervous and they promptly settled by conceding to the mine workers increases in the price of powder and house rent. These advances on their face appeared reasonable, because the price of both on the open market had advanced.

Great triumphs are these three for "mutual consent." The framers of the McAlpin contract of course are largely to blame. Either a uniform understanding should be had as to what does or does not constitute desirable mining conditions or each section should have its provisions for mining continued unchanged, except as provided in the general contract, as is the rule in the anthracite region.

The bludgeons of strikes, lockouts and delays are always possibilities when matters are open to change by "mutual consent." And perhaps changes will be made which, as in western Pennsylvania, largely nullify the original contract or its intention. The Hocking Valley contract, for instance, is a violation of the McAlpin agreement, because while most of the modifications are merely changes in discipline there is at least one which modifies the method of working so as to decrease the earning capacity of the men, provided of course that they, prior to that time, were working every hour they were in the mines, which of course was not true.

The Pittsburgh agreement of the present year modified the house-rent and powder charges, which had been fixed by Article 14 in the contract of 1913 at the same rate as under the agreement which had then just expired. It decreased the earning capacity of the men and was therefore not valid under the McAlpin agreement.

It was a bad policy for the companies in the region to demand such a concession. It was wrong for the mine workers' leaders to concede it. The operators of the Pittsburgh district can sell powder below cost to the miners and reimburse themselves from the purchasing public much better than the anthracite corporations can do it. Yet these hard-coal companies have agreed to continue their former selling price.

One concern, by no means one of the largest in the hard-coal region, loses $5,000 per month on the powder it sells to its miners, but it hopes to recoup itself by an increased charge to the public for the coal it sells, and it is justified in so doing.

The diplomacy used in Pittsburgh reflects no credit on those who contrived it. In a time of prosperity Pittsburgh should have been willing to sell powder at the old rates, just as Illinois and the anthracite region have promised to do, and should have kept the house-rent scale unchanged, as is provided in section 23 of the central Pennsylvania agreement.

The house rent might have been changed later to accord with increasing costs, provided that permission to vary it were given in the general agreement and an offsetting wage increase were provided. There is no reason why a fair profit should not be made in the housing of employees, but the present boost in the price of powder should not cause a permanent rise in wages, because once wages are up they can never be lowered. With present prices the Pittsburgh operators can easily recoup themselves for the higher price of the explosives they sell to their men.

Don't forget the special "Mine-Equipment Number" of *Coal Age* to be issued July 1. The articles in this issue are to deal with the various kinds of machinery employed in mining coal. Fans, pumps, electric locomotives, cutting machines, power-plant equipment, etc. all come under the heading of mine equipment. Particularly it is desired that the articles include as many cost data as it is possible to give.

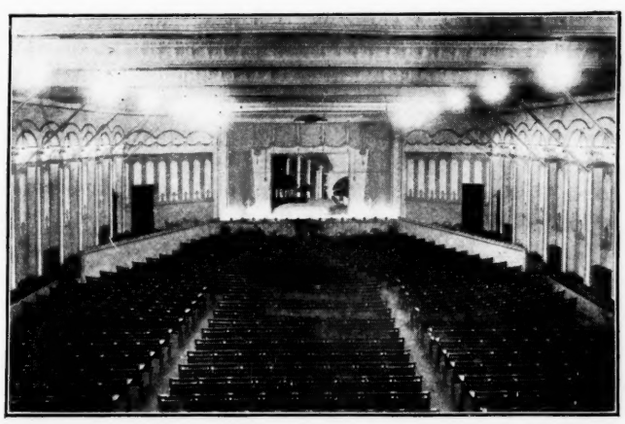
Department of Human Interest

Raleigh Mining Institute

On Apr. 15 *Coal Age* published an article on the Raleigh Mining Institute. The pictures of the interior of the Virginia Theater accompanying that notice hardly did the building justice. Other pictures which the secretary of the company, A. A. Liggett, has furnished us give a more adequate idea of the development of welfare work in Raleigh.

One illustration shows a group of Raleigh Coal and Coke Co. miners and a few of the automobiles owned by them. At a recent exhibit at the Raleigh Mining Institute Park there were assembled in the heart of this mining community some 200 automobiles owned by miners. In the recent movement for good roads the average miner was an enthusiastic booster, contrary to all expectations. Even the man who did not own an automobile had dreams that in a short while he would own one and he wanted a good road provided on which to test its qualities.

The orchestra shown in another illustration is composed of the sons and daughters of Raleigh miners. This

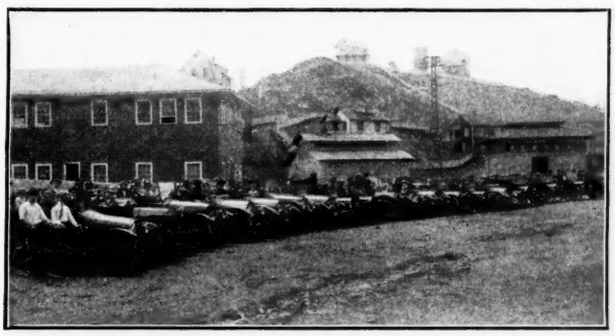


INTERIOR OF THE VIRGINIA THEATER

orchestra and the three bands fostered by the institute give free entertainments to the Raleigh public. Only the employees of the company may be admitted to such bands, and at present one consists of American whites, one of Hungarians and another of negroes. Each has proved a magnet to attract the better class of labor of its kind to the village, and at no time has there been any lack of instructors of marked ability.

The view of the interior of the Virginia theater vindicates fully what was said about it in the previous article. On May 12 a special free entertainment in this hall was given under the auspices of the Raleigh Mining Institute. Not only did it include some excellent music and singing, with a drill by the Boy Scouts, but also a "History of Raleigh" by Wade Horn, with pictures and a kinematograph address by H. F. Gregory, exhibiting in detail the movement and treatment of coal from the underground workings of the mine to the point at which it is burned, including the railroad and ocean transportation, the tidewater pier dumping and other features of the handling process.

The president of the company, John M. Wright, of Cincinnati, Ohio, accompanied by his wife, was present and entertained E. T. Stotesbury and Ed L. Welsh, capi-



RALEIGH COAL AND COKE CO. MINERS AND THEIR AUTOS

talists; J. I. Dorran, general counsel of the Norfolk & Western Ry.; J. C. Brown, of Brown Bros., bankers, and Herman Dercum, trustee of the Drexel estate, all of Philadelphia, Penn.

These capitalists were traveling in a special train through West Virginia to inspect a neighboring piece of

ORCHESTRA COMPOSED OF SONS AND DAUGHTERS OF RALEIGH MINERS

coal land. They spent the night of May 12 at Raleigh upon the invitation of Mr. Wright and were much impressed by the general well-being, coöperation and loyalty of the Raleigh employees. In all 1,500 persons, including mine workers and their families, gathered to greet the visiting Philadelphians.

Mine Safety in California

The safety movement in the State of California in the past has not had the "ginger" which it should have. There were not lacking, however, Californians like Dr. John H. Haynes, of Los Angeles—who tried to correct the ills of mining outside of California and who took a great interest in reforming the coal mines of other

states; but no one was found who could put force into the movement in California for the benefit of California miners. The work has tended to drag along, not because California mine operators, metallurgists and miners did not want to promote safety, but because the effort seemed always negatived by the impossibility of creating a unity of effort throughout the state.

Edward Higgins, chief mining inspector of the Department of Safety, a part of the Industrial Accident Commission of the State of California, has popularized the movement, which in the past has been a little too technical to appeal to the men as a whole. He felt that, like a lodge or a political party, safety needed an emblem with an appeal such as a mere colored geometrical design did not appear to have. So he stole a leaf from the Elks, the Moose, the Owls and the Red Men and produced the suggestive pin, with a brown bear hugging a red danger signal having a green safety arrow projecting through it.

Below this he placed the appropriate legend: "I am a bear for safety." The club is the Miners' Safety Bear Club, and its literature—if that word may be conceded—is written in the easy strain of a man in his shirt sleeves. The pin is as large as shown in the illustration, as big as a union button, and therefore just as conspicuous. The motto on it tells its own tale, and the sidelong glance of the bear and his open mouth lend a touch of cheerfulness to the idea.

Safety movements need that cheerful spirit if they are to be successful, and Mr. Higgins is to be congratulated on recognizing that without the human element and human interest the work he had entered on could not succeed. It is not easy to create an impression in a hundred camps which one can perhaps never enter or only visit occasionly during the year, for not only is it true that California is a large state to serve as inspector, but also it may be added that Mr. Higgins has undertaken this work coöperatively with the Bureau of Mines and must spend half his time in the work of the Federal Government.

In California there is a general impression among mine workers that the miners do not gain anything by affiliating with any safety organization. Before the compensation bill was passed the operators, the miners said, had no need to care if the mine workers lost life or limb. After its passage they believed the mine owner became the only party interested and they felt that his men had no need to care.

As a matter of fact the latter statement is by no means true. The men still have as large a stake if not a still larger interest in safety than the mine owner. It must be remembered also that the companies spent quite a little money on safety, at least in other states, even before compensation bills were passed. The miner should be willing in any event to give his enthusiasm to the cause even under the present conditions, and unions have more than once shown their interest in providing for safety.

But let Mr. Higgins speak for himself:

In talking about safety with men in the mines I have often heard the remark: "What's the use? What do we get out of it? The company is the only one that is benefited." Now, right here is where a big mistake is made. I submit that the miner is far and away the greatest gainer from safety work.

Here are the facts: The government and societies spend large sums of money every year in trying to make the mines safe, but there is no way for them to get a cash return for their efforts. Mining companies also are spending many hundreds of thousands of dollars yearly for the same object. Those that carry casualty insurance have little to gain. It is true, however, that those companies carrying their own insurance do save money by reducing accidents to employees. What if such companies do save a little money? It is not a drop in the bucket when placed side by side with the reduction of misery and suffering to the miner and those who depend on him.

What is compensation? You who have a family, is there anything that can compensate you for the loss of your life, for the loss of a leg, or a hand, or the mutilation of any other part of your body? Is there anything that can compensate you for walking around on a wooden leg, or for having to stand on a corner with a tin cup tied around your neck asking for help because you are blind? You who have not yet married, what chance have you to secure a loving wife with your looks spoiled by a blasted face, or by the loss of half of your teeth, or an eye, or an ear? Believe me, there is no money compensation for such injuries.

Local Institute Organized at Thomas, W. Va.

A district mining institute has been successfully started at Thomas, W. Va., the first sessions being held on Wednesday, Apr. 26 of this year, at the Imperial Hotel, the occasion being entirely social and comprising a dinner, speechmaking and singing. From 200 to 300 persons were present and 273 members were admitted, including the miners and day laborers, physicians and officials of the company, among whom was the president. The membership was recruited from Thomas, Coketon, Benbush and Pierce, W. Va., while some of the official force from Cumberland, Md., have also affiliated.

The meeting which followed the dinner, with its choral accompaniment, was opened by Matthew Blair, chairman of the district committee, who introduced C. L. Fay as toastmaster. D. E. Coppett, an attorney of Thomas, was the first speaker and was followed by A. W. Calloway, the president of the company, who expressed his desire to become personally acquainted with all his men and regretted that his memory did not enable him to recognize them when passing them on the road, at the tipples or in the mines.

Mr. Calloway is somewhat reserved by nature, but those who know him best realize that his social responsibility to the men in his employ is felt to the fullest. This responsibility exhibits itself better in his attitude to the problems of mine management than in a mere verbal expression of his sentiments, to which he is by no means disposed to give utterance.

He expressed his desire that all the positions in the Davis Coal and Coke Co. should be filled by men from the ranks and announced that a magazine would be published "as a medium of exchange between employees of our different mines."

Robert P. Maloney, the general superintendent, was then introduced and received tumultuous applause, which adequately testified to his popularity. Others addressing the meeting were Dr. Hoffman, Prof. C. H. Martin, principal of the Thomas High School, and Venanzio Di Bacco, a prominent storekeeper in Thomas. Monthly meetings of the local institutes will be held at all Davis Coal and Coke Co. towns.

Discussion by Readers

The Efficient Fireboss

Letter No. 8—I have read with the greatest interest the several letters on "The Efficient Fireboss," and feel it a duty to contribute my small share to this important theme. For four years I have filled the position of fireboss in some of the largest and most gaseous mines in Pennsylvania, including the Ernest No. 2 mine, which is just recovering from the disastrous explosion of Feb. 11, 1916, when 27 unfortunate men lost their lives. I was well acquainted with these men, especially Mine Foreman W. J. Balls and Fireboss Carl Stranquist.

In my opinion, an efficient fireboss should understand thoroughly the mining laws of the state and know the duties they impose on him in his official capacity. He should know the properties and understand the behavior of the different mine gases, and should know the theory and practice of mine ventilation, so that he will be able to conduct the air properly throughout the mine, causing it to sweep the working face and to pass over falls where gas is liable to accumulate.

Judgment in Reporting Gas

A fireboss must exercise good judgment in determining the quantity of gas present and its possible danger. It has frequently happened that firebosses have reported gas that would barely show on an approved safety lamp, and which could not be considered as dangerous with the exercise of ordinary care, but should call for special watchfulness and caution. This often causes trouble for the fireboss, when it is found that there is no particular danger in the places he has indicated. Many firebosses will, on the other hand, omit to report gas in certain places where they have found it, fearing that they will be censured by a mine foreman for so doing. A foreman should never object to a fireboss' marking gas or other dangers in the books, since such objection may some time be the indirect cause of a disaster. It has always been my policy to report any such dangers as I have found them and give each case the attention and care it required.

It is hardly necessary to remark that a fireboss should be strictly temperate in his habits and of a good moral character. He should be fearless in making his examination of falls and other dangerous places. If a fireboss is fearful of danger, he will often neglect to examine a fall thoroughly, just going to the edge of the fall, when the real danger is far above its top. At any moment the gas there accumulated may be driven down onto the lamps of the miners by a slight fall of slate.

An efficient fireboss must be a good miner, so that he will understand other dangers that are liable to arise from mining the coal. He must be ambitious to keep his section of the mine in good condition, properly timbered and free of all obstructions to the air current. He must see that all loose material, such as rails, props, and cap pieces not in use, are properly cared for and not allow them to become covered up and lost. Finally, a good fireboss must be able to instruct the men in his charge in regard to the best methods to employ in securing their own safety. This will often require much patience and determination on his part. But a fireboss who fails to do this and who is always waiting for the hour to quit the mine will not prove himself efficient.

Samuel Jones, M. F.,
Madera, Penn. Jefferson & Clearfield C. & I. Co.

Inefficiency of Mine Foremen

Letter No. 2—In his letter on this subject, *Coal Age*, May 13, p. 857, Samuel Jones gives six good reasons for the inefficiency of mine foremen. Although it may be implied in Mr. Jones' second reason, I would add a seventh to those he has given.

In my opinion, the favoritism displayed by some foremen in dealing with their men acts as a hindrance to their efficiency. As is well known, there are in practically every mine good, bad and indifferent places where men must work. Many a foreman will often manipulate affairs so as to give the best rooms or entries to his favorites, while the poorer places are assigned to men whom he regards indifferently, and the low coal and wet and rocky places are reserved for his particular enemies, or men that he desires to get out of the mine without discharging them.

Effect of Favoritism in the Mine

The practice of favoritism by a mine foreman is sure to cause dissatisfaction, and this will be manifested, sooner or later, in labor troubles that often prove serious in the end. In any event, the practice of favoritism is bound to destroy the morale of the working force and develop all the jealousies of which not only miners but men in general are possessed.

What I have said in regard to the assignment of working places applies equally to the granting of allowances for extra work, or making other concessions and conferring special privileges. Miners expect and are entitled to a "square turn," and every mine foreman's success will depend in part on giving to each man his dues without discrimination. There may, of course, be seeming violations of the square-turn rule, in the miner's estimation, when no violation is intended by the foreman. A mine foreman cannot be expected to put an inexperienced miner in an extra-hazardous place—he would not be warranted in so doing. Neither could he be expected to start an expert bratticeman to dig ditches. Miners who are fair-minded recognize these facts.

On the other hand, a mine foreman must not neglect to promote the man of long service, or the ambitious man when a promotion is deserved. However, when making promotions or placing men, the foreman must remember that he is hired and paid to keep up production and to keep down costs. Only by so doing can he promote efficiency and safety among the men. His acts and decisions should be governed solely by these considerations and not by those of friendship or relationship. When a choice

between men is necessary, no man, already an employee, should be discriminated against on account of nationality, religion or private opinion unexpressed.

Mr. Jones does well to emphasize the drink habit by naming it as one of the first causes of inefficiency in a mine foreman. A drinking foreman cannot consistently work for sobriety among his men, and the list of evils that follow in the trail of drunkenness is too well known to require mention here. Passing by the other excellent suggestions made, a few comments on the sixth reason given may not be amiss. This has reference to the purchase of supplies for the mine, and in that connection I would suggest that standardization is important. Suitable tests should be made to show which of the various makes of different classes of mine supplies are best and most economical. Again, statistics should be gathered from the mine reports to show the cost of such supplies per ton of coal mined whenever practicable.

The mine foreman should always avail himself of every opportunity to learn the best practice in each department of the work in his charge. He can do this most effectively by reading and observation. Technical and trade papers should be studied diligently, and the foreman should make occasional visits to other mines to increase his knowledge by observing methods different from his own and noting the results obtained in their use. GEORGE N. LANTZ.

New Straitsville, Ohio.

Letter No. 3—In visiting many mines worked under various natural and artificial conditions, numerous small and large things are frequently found that are responsible for at least some of the lack of efficiency observed in the mine management. Obviously, these matters are not always such as can be remedied by the mine foreman, although he can often improve some of them. It is regarding a few of the latter that I write, hoping to benefit some who may read this letter.

In many cases a brief suggestion offered in all kindliness and sympathy will prove a direct benefit to the too often handicapped and harassed mine foreman, who is reminded thereby of his neglect or failure in performance of duties small in themselves but nevertheless important. There are frequently larger matters, of the existence of which the foreman is fully conscious, but which he has been unable to improve for lack of the necessary funds. The latter are not always forthcoming and the needed improvements must wait.

It often happens, however, that the foreman has a less plausible excuse for his shortcomings, and his attention being drawn to certain matters, he will tell you that he "hasn't time to bother with such a little detail" as a few inches of water standing in a low stretch at the side of the main motor road. He adds, "The company expects me to look after the big things, and it keeps me hustling to put out the coal and keep the costs down to what they require."

This foreman fails to appreciate the fact that if the motor stalls at such a place because of wet rails the loss of time, perhaps trivial the first day, grows serious the longer the trouble remains. By the end of the month the time lost from this cause would have served to clear the ditch and drain the road many times and would have left him free to give his time and energy in other places where needed. The importance of his neglect in this small matter would be more plain to him could he see the drivers and gathering motormen standing idle on the inside partings talking war news while waiting for the return of the motor with empties.

Again, he temporizes with a bad piece of roof, as he did with the water on the haulage road. For a fractional part of the ultimate expense caused by his neglect to secure the place, had it been taken in time, the trouble could have been avoided. But some morning the big motor goes tearing by the place hauling a long trip behind it, when down comes the roof, and dust and profanity alike becloud the atmosphere. Why the fall should have occurred at that particular moment, when every effort was being made to score a record output for the day, will never be explained, but the incident is one by which the mine foreman should profit.

At another time the foreman finds a driver or motorman coming out with only half a trip and is chagrined to learn that the fireboss had to send home half the men working in that section because the timber ordered for their places had not been sent in the night before. Another day, or perhaps the same "unlucky shift," word is sent out for another motor to go to a butt heading and haul out a motor whose armature had burned out. The foreman then remembers that this same motorman had mentioned over a week ago the "trivial" matter that his machine was running hot. What might then have been avoided by a few minutes' work and a short delay on that run will now require that the motor be sent to the shop for repairs, throwing the entire section of the mine idle for a season, to say nothing of the expense of rewinding the armature.

Someone asks, "Could the foreman be blamed in this case? Was he not hustling for all he was worth to make a good day's run, and didn't the company pay him for that"? I answer, "Assuredly; but the company desires efficiency in its mine foreman and expects him to keep the equipment in proper working condition, knowing full well that "a stitch in time saves nine."

AN INTERESTING INCIDENT

When inspecting a mine some time ago, in the performance of my duty, I observed that a certain feature seemed to me to be neglected. I concluded that there was much need here for more frequent examination and, calling the mine foreman, I inquired how often he had examined the place. With much bombast, he replied, "Once a day, as the law requires—no more and no less." There are four assistant foremen at that mine. Each man has charge of a certain section. When my inspection was completed and I had turned the matter over in my mind the thought occurred to me, Here is a concrete instance of lack of efficiency in mine management that might properly be termed "deliberate" rather than "unintentional," as is generally claimed in such cases. And for many days those words, "Just what the law requires," continued to run in my mind.

In closing let me ask, If mine foremen are consistent, why do they not, in the name of efficiency and justice to themselves, their employers and the men in their charge, go a step further and do more than "just what the law requires," when their mining sense and judgment should tell them this was necessary? Would they be doing anything more than common sense and equity demand? I regret to say that there are scores of in-

stances where the most conscientious foreman cannot, despite his most strenuous efforts, accomplish all that the law demands. Too often, however, a foreman, will refrain from doing what the law does not explicity command, although common-sense tells him it is his duty, law or no law. In order to keep things moving in the mine, he takes a chance and neglects the law's requirements. JAS. T. REYNOLDS.

Houston, Penn.

Detecting Gas by Smell

Letter No. 3—Referring to the inquiry in regard to detecting marsh gas by smell, *Coal Age*, May 6, p. 815, permit me to say that I have frequently heard it stated that miners who have had a long and large experience with firedamp in gaseous mines are able to detect the presence of such a mixture, or at least are warned of its dangerous presence through their senses and without the medium of a safety lamp or other mechanical means for its detection.

However, I have not seen this claim demonstrated in fact and believe it to be based largely on an erroneous supposition that marsh gas, as found in mines, possesses characteristics that have not been discovered in the laboratory analysis, and that such analysis does not therefore correctly describe the gas. Marsh gas (CH_4), the explosive constituent of firedamp, has been found by chemical analysis to be tasteless, colorless and odorless when in a pure state. It will be readily agreed that the analysis of any gas is only of practical value when the gas is pure and not mixed with other gases. It is only in this condition that its true qualities can be ascertained.

The qualities of marsh gas just mentioned render its detection by means of the senses impossible, since they are not of a nature that can be perceived through the senses, unless it might be the effect produced on the human system when the gas is breathed into the lungs. I do not, for a moment, question the fact that, under practical mining conditions, marsh gas may become mixed with other gases that would render the mixture susceptible to the sensation of smell. Indeed, this condition may naturally be supposed to exist throughout an entire mine or district.

It should be recognized, however, that such a firedamp mixture cannot be truly classified as representing the qualities of marsh gas, but rather the combined qualities of the gases forming the mixture, and that these may or may not be present under varying conditions in mines. It follows, therefore, that the work of testing for gas in mines should not be conducted or handled as though the gas were in a pure state, which is seldom the case.

Within the narrow confines of a mine, owing to the various gases produced in the operations of mining and the varying character of the gases that issue from the strata, chemical changes are possible, and the resulting products cannot be predicted with certainty and exactness. As a result of these conditions, a mixture giving plain indications on the lamp of the present of marsh gas may contain other ingredients whose characteristics are widely different and affect the sense of smell. Again, the mixture may contain marsh gas and yet be such as to give no indication on the lamp and may or may not be perceptible to the sense of smell. This, I believe, will explain the error that is so frequently made in assuming that marsh gas has an odor that can be detected.

It is well known that marsh gas contains no oxygen and when mixed with air the mixture may contain far too small an amount of oxygen to support life. It is not strange that, in this condition, the gas when breathed would produce dizziness, owing to the depletion of the oxygen in the mixture breathed.

When testing for gas with a safety lamp I have frequently observed a pungent odor similar to that of slightly soured dough. This odor, however, is produced by the combustion of the gas in the lamp and cannot be regarded as a quality of the gas itself. I have also discovered gas with a safety lamp in places where there was a strong odor of petroleum, but the odor remained after the gas was removed. I. C. PARFITT.

Jerome, Penn.

Letter No. 4—There is no question but that what is commonly called "marsh gas" or "firedamp," as met with in the mine, can be detected by smell. In my opinion, this is due to the rapid diffusion of the gas and its consequent mixture with air and other gases. In the pure state marsh gas is universally admitted to be "colorless, odorless and tasteless," but in my experience I have found that when approaching in the mine a body of gas that could be detected on a lamp, I could always smell the gas first, and on raising the lamp would get a cap at about the same level at which my nose had detected the smell.

I recall two mines in which the nose was considered a good monitor in detecting gas. One of these was in the steam coal and the other in the anthracite field, both in South Wales, and both longwall mines. In the one mine the coal was 4 ft. high, requiring the roof to be brushed 3½ ft. on the road, giving a total height of 7½ ft. In the anthracite mine the coal was 5 ft. thick and the roof brushed 18 in., giving a total height of 6½ ft. on the roads. In both mines if the line of gob was up to the rippings, or ahead, we were troubled with gas collecting at the face of the ripping where the boxes had to be loaded; but this gas could always be detected by the smell when present. I frequently tested these points with the safety lamp, but do not remember once finding gas with the lamp when I did not smell it first. If gas was present, curtains were at once erected and, at the first opportunity, the roof was brushed to the face.

It was always my habit to use the lamp in places where the nose would not be practicable, such as cracks in the roof, or behind timbers, or in cavities and other high places. However, when the height did not much exceed 6 ft., the nose always detected the gas before its presence was shown by the lamp.

I cannot understand Mr. Greaves' experience, where he describes men falling down after taking a single breath of the gas. In my opinion, such an effect could only be produced by taking a deep breath of practically pure marsh gas. I recall one experience of working with two other men under a strong blower that could be felt by holding the hand within 12 in. of the crack. The place was ventilated by a good split of air. We had to

build a chock to form the corner of an entry. The work required special care, during which time we breathed air containing a considerable percentage of marsh gas, which reached an unhealthy proportion toward the completion of the work. But I don't remember experiencing any physical suffering at the time, although for three days afterward whatever I ate or drank tasted of marsh gas.

Overcome by Hydrogen Sulphide

On another occasion we were erecting a collar on two legs at a point where the roof had fallen 18 in. high. The collars were already notched to fit the legs and, being only 7 in. in diameter and about 6 ft. long, the work was a comparatively easy task, and I took but one breath while putting the collar in place. As a result, however, I saw everything green and was giddy for some time after. The gas, in this instance, however, was not marsh gas, with which I am very familiar, but was found to be hydrogen sulphide (H_2S). This gas being heavier than air, one would not expect to find at the roof; but this is explained by the fact that it was given off in the roof, and there was just sufficient air leaking through the curtain near by to prevent our having detected its presence before setting up the collar.

The question arises in my mind as to whether Mr. Greaves' experience was not similar to mine. It may be that the gas in that case was not marsh gas but hydrogen sulphide, or a gas having a similar poisonous effect. In company with other timbermen I have been frequently called to timber falls from 20 to 30 ft. high, where we have had to build chocks on top of the timber frames to give support to the roof. In these places marsh gas was often present in dangerous quantities, while a good current of air was flowing in the airway below. In all my experience, however, I have never heard of a man being overcome by breathing marsh gas under these conditions.

East St. Louis, Ill. W. L. Morgan.

Locating a Booster Fan

Letter No. 6—The question of properly locating a booster fan is one of growing importance in the successful ventilation of coal mines today. In my opinion, in order to place a booster fan where it will do the most good, a person must know every feature of the mine. It has been said that we profit by others' failures and mistakes. If this is true, some will, no doubt, profit by the following incident that came under my observation relating to the location of a booster fan that proved a complete failure:

The mine was an old mine working 300 or 400 men and had a large area of abandoned workings that had been closed off by stoppings built of rough lumber. These were a source of continual worry, as they needed constant attention to prevent them falling down. The air current had to travel a long distance before reaching the men. The air was very bad and barely sufficient to meet the requirements of the mining law. The mine was ventilated by two fans, one an exhaust fan and the other a blower, both working on the same continuous air current.

Owing to these conditions, it was decided to put in a booster fan, which was purchased and installed in the center of the mine, as nearly as possible midway between the two fans. Seemingly the location of the booster received little consideration further than to give it a central position in the mine. When the arrangements were completed and the booster started, it was found that the condition in the workings was no better than before. As a result, the fan was taken out and the general conclusion was that "booster fans" were a nuisance in a mine.

Of course, I had no authority to act and did not make any suggestions, but a little study of the situation convinced me that the ventilation of the mine could be very much improved by changes that had not been considered. I found that the exhaust fan was smaller and run at a higher speed than the blower, the speed of which it was not possible to increase, and as a result the latter was not doing its share of the work. Owing to the expansion in the area of the airway outby from the exhaust fan, the blackdamp from the old workings tended to accumulate there, making a very bad condition on the haulage road.

The mine inspector being called in consultation, it was decided to reverse both fans, thus making the larger fan the exhaust and the smaller fan the blower. When this was done, it was found that the large fan, now the exhaust, easily handled all the air from the smaller fan operated as a blower, and it was possible to set open the door on the main haulage road formerly kept closed to prevent the air shortcircuiting and returning to the hoisting shaft. Not only did the large fan now take all the air coming from the mine and supplied by the blower, but there was a good supply also coming from the hoisting shaft which greatly improved the condition on the main haulway. These arrangements, together with the building of some new stoppings and a few other changes, produced a vast improvement in the workings, where there was an ample supply of air. Also, the arrangement proved less expensive to maintain.

Study Conditions Carefully Before Making Change

My purpose in relating this incident is to show that sometimes a change in the equipment, or a simple alteration in the circulation in the mine, will often prove more satisfactory than the installation of a booster fan. The conditions in the mine should always be studied from a practical standpoint before attempting any change.

Referring to the original sketch given in the inquiry that started this discussion, *Coal Age*, Mar. 25, p. 550, I cannot see that there is a more suitable place for the location of the booster in that mine than that suggested in the answer to the inquiry and marked *A* in the figure there given. But it does seem possible that the ventilation indicated by the arrows in the same figure could be changed so as to improve the condition in the mine, without going to the expense of installing a booster fan. It appears that two return currents must pass through a single entry and over a single overcast, which makes a poor arrangement.

To decide this fully, however, one should go into the mine and become familiar with the conditions prevailing in the workings, which cannot always be well understood from a small sketch. My conclusion is, therefore, that there are many things to be considered before a decision can be reached that the results to be derived from the installation of a booster will be sufficient to pay for the equipment and its upkeep. I hope yet to see many good suggestions from men who have had experience along this line whether they have succeeded or failed.

Cleaton, Ky. Ostel Bullock.

Inquiries of General Interest

Equalizing a Double Hoist

Some time ago there appeared in *Coal Age* a question in regard to a common difficulty experienced in hoisting practice, and which, it seems to me, was not answered as fully as it should have been. The question was as follows:

> If one rope of a double-compartment mine hoist is 5½ in. short and the other rope 3 in. long, how will you arrange these ropes so that the cages will reach their respective landings at the same time?

The answer to this question, *Coal Age,* Vol. 4, p. 99, was as follows:

> In the present case, as we understand the question, one rope being 5½ in. short and the other 3 in. long, there is a difference of 2½ in., which is the actual shortage when one of the cages is brought flush with the landing. It is then only necessary to lengthen the rope supporting the other cage 2½ in.

Attention was drawn to this question, later, *Coal Age,* Vol. 4, p. 245, explaining another interpretation of the meaning intended; but, at that time or since, no solution was given of the problem with respect to the conditions mentioned, which I will describe more fully as follows:

It frequently happens that, owing to an uneven wearing of the lagging of the drum, or to one rope being more worn than the other working on the same drum—as when the old rope on one side of the shaft is replaced by a new one—the difficulty arises that the same number of turns of the drum measures a different length in the shaft, or depth of hoist. As a consequence, when No. 1 cage is on the bottom, No. 2 cage hangs, say 5½ in. above the upper landing. Then when No. 2 cage is on the bottom, No. 1 cage hangs 3 in. below the upper landing. Thus, No. 1 rope is 5½ in. short, while No. 2 rope is 3 in. long. Certainly, in this case, to lengthen the short rope on No. 1 cage would not remedy the difficulty, since No. 1 cage would then reach the bottom that much sooner and No. 2 cage would hang that much more below the upper landing. The difficulty here is to be remedied by skimming up the lagging so as to increase the diameter on one side of the drum and thereby equalize the movement of the two cages for the same number of turns of the drum.

Spring Hill, N. S., Canada. HUGH PEPPARD.

The reading of the foregoing question is somewhat indefinite. The answer quoted above assumed a uniform diameter of the drum, giving an equal movement of the two cages in the shaft, and ascribed the trouble wholly to a difference in the lengths of the two ropes, No. 1 rope being 5½ in. short and No. 2 rope 3 in. long, causing the first cage to hang 5½ in. above the lower landing when the second cage was 3 in. below the upper landing. This assumption would give a net difference of 2½ in. to be corrected by lengthening the short rope that amount, as stated.

We will assume now, however, that the meaning of the question, as suggested by correspondent is: When No. 1 cage is at the lower landing, No. 2 cage hangs 3 in. below the upper landing, its rope being 3 in. long; and when No. 2 cage is at the lower landing, No. 1 cage hangs 5½ in. above the upper landing, its rope being that amount short. It is clear that this condition cannot obtain with a uniform diameter of drum, since, while No. 1 cage is rising through a height equal to the depth of the shaft plus 5½ in., No. 2 cage falls through the same depth of the shaft less 3 in. In this case no amount of lengthening or shortening of the rope will correct the difficulty, which must be remedied by equalizing the effective diameter of winding namely, the diameter of drum plus the diameter of rope, both of which may be different for the two hoists.

The solution of the problem on this assumption is as follows:

Let D equal the depth of shaft; d_1, the effective diameter of winding for No. 1 hoist; d_2, the effective diameter of winding for No. 2 hoist; n, the number of revolutions that the drum makes in changing cages at the lower landing. We have then, for each respective hoist:

No. 1 hoist, $$n\pi d_1 = D + 5\tfrac{1}{2} \qquad (1)$$

No. 2 hoist, $$n\pi d_2 = D - 3 \qquad (2)$$

Subtracting equation 2 from equation 1 to eliminate D, we have

$$n\pi(d_1 - d_2) = 8\tfrac{1}{2} \qquad (3)$$

But evidently the difference of the effective diameters $(d_1 - d_2)$ is equal to twice the thickness of shimming required to equalize these hoists, or in other words, to bring both cages, in turn, to the upper landing when changing cages at the lower landing. Then, substituting $2t$ for its value $d_1 - d_2$, we have

$$2n\pi t = 8\tfrac{1}{2}$$

$$t = \frac{4.25}{n\pi} \qquad (4)$$

If desired, with very slight error, the difference between the two hoists may be taken up wholly in the last few coils by increasing the effective diameter of winding gradually under those coils, by means of wedged-shaped splicing of the lagging at one end of the drum. In this case let n_1 equal the number of coils so treated; t, the thickness of the butt end of the wedge-shaped splicing; and d_1, the average diameter of the conical section formed by the wedge-shaped splicing at the end of the drum. Then,

$$n_1\pi(d_1 - d_2) = 8\tfrac{1}{2} \qquad (5)$$

But here $d_1 - d_2 = t$, and we have finally

$$t = \frac{8.5}{n_1\pi} \qquad (6)$$

To illustrate, suppose the net difference (8½ in.), in this case, to be taken up in five coils, making $n_1 = 5$, we have

$$t = \frac{8.5}{n_1\pi} = \frac{8.5}{5 \times 3.14} = 0.54 \text{ in.}$$

which is the thickness of the butt end of the wedge-shaped splicing on the end of the drum.

Examination Questions

Miscellaneous Questions

(Answered by Request)

Ques.—(a) How will an air current of 150,000 cu.ft. per min. divide naturally between the following splits or airways in a mine: Split A, 6x8 ft., 2,400 ft. long; split B, 6x14 ft., 4,200 ft. long; split C, 6x12 ft., 1,800 ft. long? (b) Where must regulators be placed, and what must be the size of the opening in each regulator in order to divide the air current in the following proportions: Split A, 40,000 cu.ft.; split B, 90,000 cu.ft.; split C, 20,000 cu.ft.?

Ans.—The area a, perimeter o, and length l, for each respective split, are as follows:

Split A, 6x8 *ft.*; $a = 48$ *sq.ft.*; $o = 28$ *ft.*; $l = 2{,}400$ *ft.*
Split B, 6x14 *ft.*; $a = 84$ *sq.ft.*; $o = 40$ *ft.*; $l = 4{,}200$ *ft.*
Split C, 6x12 *ft.*; $a = 72$ *sq.ft.*; $o = 36$ *ft.*; $l = 1{,}800$ *ft.*

(a) The first step in the solution is to calculate the part-potential value for each of the several splits, as follows:

Split A, $X_a = a\sqrt{\frac{a}{lo}} = 48\sqrt{\frac{48}{2{,}400 \times 28}} = 1.283$

Split B, $X_b = 84\sqrt{\frac{84}{4{,}200 \times 40}} = 1.878$

Split C, $X_c = 72\sqrt{\frac{72}{1{,}800 \times 36}} = 2.400$

Sum of part potentials, 5.561

But the quantity of air in circulation is always proportional to the potential of the airway, and, in splitting, the ratio of the quantity in any split to the total quantity is equal to the ratio of that split potential to the sum of the potentials of all the splits. Applying this principle, the quantity of air passing in each split is found as follows:

A, $q_a = \frac{1.283}{5.561} \times 150{,}000 =$ 34,600 *cu.ft. per min.*

B, $q_b = \frac{1.878}{5.561} \times 150{,}000 =$ 50,600 *cu.ft. per min.*

C, $q_c = \frac{2.4}{5.561} \times 150{,}000 =$ 64,800 *cu.ft. per min.*

Total, 150,000 *cu.ft. per min.*

(b) In order to accomplish the desired proportionate division of air in the mine—namely, split A, 40,000 cu.ft.; split B, 90,000 cu.ft.; split C, 20,000 cu.ft.—regulators must be placed to control the circulation of air in splits A and C, leaving split B open. To determine this, and to ascertain the size of the opening in each regulator, it is first necessary to calculate the natural pressure due to the circulation of the desired quantity of air in each respective split. This can be done by applying the usual formula for pressure, $p = ksq^2/a^3$, or the same result can be obtained by dividing the desired circulation by the part-potential value of each split and multiplying the square of this quotient by the coefficient of friction $k = 0.00000002$, which gives for the natural unit pressure

A, $p_a = 0.00000002\left(\frac{40{,}000}{1.283}\right)^2 = 19.45$ *lb. per sq.ft.*

B, $p_b = 0.00000002\left(\frac{90{,}000}{1.878}\right)^2 = 45.92$ *lb. per sq.ft.*

C, $p_c = 0.00000002\left(\frac{20{,}000}{2.4}\right)^2 = 1.38$ *lb. per sq.ft.*

The split having the greatest unit pressure, namely, split B, is then the open or free split, and regulators must be placed in each of the other splits, A and C. After the regulators are in place and adjusted, the pressure at the mouth of all the splits being the same, the pressure due to each regulator is found by subtracting the natural pressure for that split from the natural pressure for the open split. Thus the pressure due to the regulator in split A is 45.92 — 19.45 = 26.47 lb. per sq.ft., which gives a water gage of 26.47/5.2 = 5.09 in. Likewise, the water gage due to the regulator in split C is (45.92 — 1.38) ÷ 5.2 = 8.56 in.

Finally, the opening in each regulator is

Split A,

$$A_a = \frac{0.0004q}{\sqrt{w.g.}} = \frac{0.0004 \times 40{,}000}{\sqrt{5.09}} = \frac{16}{2.26} = 7.0 \text{ sq.ft.}$$

Split C,

$$A_b = \frac{0.0004 \times 20{,}000}{\sqrt{8.56}} = \frac{8}{2.93} = 2.7 \text{ sq.ft.}$$

Ques.—What system of ventilation would you adopt for conducting the air through the workings of a gaseous mine?

Ans.—The main entries of a gaseous mine should consist of, at least, one central intake and haulage road, flanked by two separate return airways, one for each side of the mine, forming what is known as the triple-entry system for the main roads. The mine must be ventilated on the exhaust system, using two large centrifugal fans each capable of producing an adequate supply of air for its respective side of the mine. Each pair of cross-entries should be ventilated by a separate air split as soon as its development will warrant the building of an overcast on the main airway. The air from each section is conducted at once into the main return airway on that side of the mine. In every case the details of the circulation in a gaseous mine must be determined by the conditions prevailing in the mine.

Ques.—What is the difference between light carbureted hydrogen (CH_4) and firedamp?

Ans.—Firedamp, as understood in this country is a mixture of marsh gas and air in inflammable or explosive proportions, as indicated by its name. Light carbureted hydrogen is marsh gas unmixed with air. The specific gravity of firedamp is slightly greater than that of the the undiluted gas, depending on the percentages and kinds of gases in the mixture.

Coal and Coke News

Washington, D. C.

Another progressive step in the development and advancement of the material interests of the Territory of Alaska came with the official announcement by Secretary Lane, of the Interior Department, that regulations have been issued under which private individuals and corporations may without further delay begin the leasing and operating of the vast coal fields of the Northland. No longer are the extensive anthracite and bituminous resources of Alaska to be closed to American capital and enterprise.

Ten years have elapsed since the Alaskan coal fields were withdrawn from private entry and development. The regulations are accompanied by maps and important general information regarding the lands in question. Copies may be secured on application to the Commissioner of the General Land Office.

The issuance of these regulations may be said to mark an epoch in the history of Alaska, for Secretary Lane's announcement means that about 33,370 acres in the Matanuska section are restored to entry. Small areas in each of the fields have been reserved as required by law, and all the rest of the coal lands opened to private lease in amounts not exceeding 2,560 acres to any one person or corporation.

Areas of leasing units vary in size from 320 to 1,200 acres in the Matanuska region, and from 200 to 1,280 acres in the Bering River section, which begins about 3 mi. from the Copper River & Northwestern R.R. The Matanuska fields are less than 200 mi. from Seward, and the Government's railroad is now under construction to that point. Coal from Matanuska can be brought to tidewater at the new town of Anchorage, about 7 mi. southerly. There are 19 leasing units in the Bering River district. Both regions contain high-grade bituminous and anthracite coal.

Leases will be granted for a period of 50 yr. The Government exacts a royalty of 2c. a ton the first 5 yr., and 5c. a ton for the succeeding 20 yr. After this period of 25 yr., it is provided that the royalty shall not exceed 5 per cent. of the selling price of the coal. The royalty exacted is considered small but reasonable in view of all the conditions, and was admittedly made low for the purpose of encouraging the leasing and also the development of local markets. The opening of these fields will mean early cheaper coal for mining, manufacturing and other purposes, not only in the Territory but along the Pacific Coast generally. It is expected that it will also prove a decided incentive to increased activity among prospectors.

The Government's plan is to receive proposals for leases without delay. Preference will be given, it is said, to those who will make the largest investments and the earliest development of the coal fields for commercial purposes.

The form of lease is similar in large part to the private leases obtaining in the West Virginia coal fields and has been passed upon by a board of practical coal operators who have approved it as a workable lease.

HARRISBURG, PENN.

Judge Thompson, in the United States district court on May 27, sustained demurrers of the Philadelphia & Reading Railway Co. to indictments pending against it for alleged violations of the Interstate Commerce Commission and Elkins acts. This is the second time the Government's case has received a setback by indictments charging these violations being quashed by Judge Thompson.

The railway company was charged with failing to file with the Interstate Commerce Commission schedules of its rates and charges for coal transported by the Philadelphia & Reading Transportation Line of barges and tugs, plying between the Port Richmond coal piers and New England ports; also, with having granted special privileges and facilities to the Philadelphia & Reading Coal and Iron Co. and with favoring certain coal shippers by failing to assess and collect demurrages on carloads of coal that have been detained at the Woodlane yards, 8 mi. from Port Richmond, the point of destination, over the allotted time.

In sustaining the demurrers and quashing the indictments, Judge Thompson holds that the indictments are defective because they "do not aver with sufficient particularity and certainty," the charges intended to be preferred.

The first setback of the Government case was when Judge Thompson quashed three indictments found by a Federal Grand Jury in December, 1914, because of the improper presence of a stenographer in the Grand Jury room. United States Attorneys will draft new indictments charging similar offenses for presentment to the Grand Jury now in session, it has been announced.

Frostbite is a Compensable Injury

The State Workmen's Compensation Board in an opinion rendered on May 26, upheld the award of Referee George W. Beemer, of Scranton, that a claimant for compensation on the ground that he had been incapacitated by frostbite was entitled to relief under the compensation act. The case arose when an employee of a quarry and stripping company had the fingers of both hands frozen to such an extent that he was totally incapacitated.

The employing company appealed, contending that the injury was not one on which compensation should be paid, since it was due to a condition not possible for an employer to control or avoid, and that the claimant might have avoided injury by wearing warm gloves, and further that it was a risk common to all persons whose business, employment or pleasure called them outdoors.

In the opinion of the board, it is held that English compensation cases cited do not apply, but that freezing and frostbite have been held to be injuries by accident in Massachusetts and by the Solicitor General of the United States in construing the Federal act. The opinion concludes: "Frost bite causes an immediate change in and injury to the part affected; it cannot be considered a disease in any proper sense of that word. It is of sudden origin, and is, therefore, violence to the physical structure of the body and a compensable injury."

There have been a number of such cases reported to the Compensation Bureau, especially from the Hazleton region.

In an opinion given to State Treasurer Robert K. Young, chairman of the State Workmen's Insurance Fund, Deputy Attorney General William H. Keller, holds that the board must set aside 5 per cent. of all premiums collected on insurance in the state fund, for the creation of a surplus until the surplus amouuts to $100,000, but that it also has authority to set aside more than 5 per cent. for the surplus fund until it reaches $100,000. This surplus fund is to cover what is known as catastrophe hazard of all subscribers to the fund and to guarantee the solvency of the fund.

The Deputy Attorney General also holds that after the surplus fund amounts to $100,000, the board may, at its discretion, set aside 5 per cent. of the premiums collected for the purpose of maintaining the surplus fund.

No New Operations Should Be Started

James F. Roderick, state chief of mines, in a review of Pennsylvania's coal-mining operations declares that "it would be a fortunate thing for the trade if no new operations were started during the next 5 yr. and existing corporations could be controlled to meet the demands of the market." This statement, which is made in the course of a discussion of the movement now being worked out to restrict the state's bituminous coal trade, the chief says would remove the danger of overproduction and breaks in prices which affect both operators and men.

In the course of the discussion of the subject of control of the coal trade Mr. Roderick says:

The beginning of what may finally result in a wise and beneficial restriction of the bituminous coal trade is being made in some mining sections where the operators are combining in such a way that they may have more control of the output. Coal operations are now conducted on a large scale and in many cases there is a tendency to purchase plants that are well developed rather than make new developments. This course will finally eliminate some of the smaller concerns and make it possible to control or restrict the output. It is merely a movement to meet more fully the economic law of supply and demand. Another feature of this tendency is seen in the effort to transfer the control of existing plants from weak to strong hands. Powerful interests are gradually reaching out and getting control of many of the lesser operations. This effort, following as it does the effort made in recent years to control the coal-bearing lands by certain great interests, may lead eventually to the control of both the lands and the plants. It will take time and money to accomplish a program of this kind, but it is one of the things toward which the coal trade is tending.

The association movement, a movement that contemplates the creation of a statistical organization in the major-producing districts for the purpose of gathering facts as to production and sale or consumption of coal, is another effort in the same direction. With the figures of production in their posession the operators can tell to what extend there is overproduction and can also tell what the result on prices will be if the same rate of production is continued. This organization will also compute the cost of production and the cost of selling and be intelligently informed as to the minimum selling price each producer must get in order to avoid loss. The originators of the movement hope to get the coal producers to sell their product for not less than the actual cost of production, including all expenses attending it.

It will thus be seen that what might be termed a practical mastery or control of the bituminous trade is slowly being accomplished. The coal lands and the plants are being controlled as well as the method and degree of operation, but it will no doubt be a long time before these efforts can accomplish great results. What has been done, however, may be looked upon as the beginning of a rational control of the great industry. It would be a fortunate thing for the trade if no new operations were started during the next 5 yr. and the existing operations could be controlled to meet the demand of the market. It would remove the danger of overproduction and the consequent break in prices that always proves ruinous to some of the operators just at a time when a profit seems to be in sight. This also seriously affects the comfort and welfare of the employees by lowering their wages.

PENNSYLVANIA

Anthracite

Jeddo—The strike of 800 men, employed about the coal strippings at Harleigh, Ebervale, Jeddo, Coleraine and Buck Mountain, that has been going on during the last few weeks, was settled on May 25, by the men being granted an advance in wages.

Wilkes-Barre—Anthony Lavonski, 19, a miner, has gone insane following an accident on Feb. 7, when 7 men lost their lives by an explosion of gas in Lance colliery. The coroner had expected to learn from him, the sole survivor, the cause of the explosion, but while he has recovered from severe physical injuries, it has been found necessary to remove him to an asylum for the insane.

Shenandoah—By an agreement which has been signed by James Matthews, district president of the union, and W. J. Richards, president of the Philadelphia & Reading Coal and Iron Co., acting for the operators, the rockmen and tunnelmen in district No. 9 are to receive an increase in pay of 5 per cent. in addition to the 8-hr. day, to become effective as of Apr. 1.

Hazleton—The Cranberry and Crystal Ridge collieries have now been entirely equipped with electric power, which is procured from the Hauto plant. This does away with most of the mules formerly used for motive power.

Bituminous

Windber—More than 1,500 men employed by the Wilmore Coal Mining Co. spent May 25 working the highways in this vicinity. The mines were closed by the officials and the entire day was given over to the observation of "good-roads day." Scores of teams were placed at the disposal of the men, as well as many automobiles, and in these the men were hauled to and from their work. The ladies of some of the churches served dinner to the miners. It is estimated that the day's work cost the coal company about $1,000. Miles of roads were repaired. The miners were called together in a mass meeting several days before and an organization was formed. The men were assigned to sections of road nearest the mines in which they worked. The foremen of the mines were then placed in charge of the men who work under them every day.

Connellsville—The production of the Connellsville region for the week ending May 20, amounted to 434,000 tons. The region is now operating 90 per cent. of its ovens to 90 per cent. capacity, and the coke is being shipped out as rapidly as it is made. The car supply is good and no stocks are accumulating on the yards, but some of the steel companies owning coke plants are stocking this fuel at the furnaces in anticipation of a scarcity of labor during the summer.

WEST VIRGINIA

Charleston—In reversing the Circuit Court of McDowell County and remanding for new trial the case of Simpson against the Carter Oil Co., the Supreme Court of Appeals recently found that a coal company, which knowingly permits its employees to habitually ride on coal cars to and from their places of work, is bound to use reasonable care to maintain its tracks and cars in a reasonably safe condition. A posted rule warning all persons that they ride upon any incline, car, engine or motor at their own risk does not absolve the company from liability if it makes no reasonable effort to prevent the employees from so riding.

Kimball—Four men were killed in a mine explosion near here May 27. The cause of the blast is unknown. The operation where it occurred was owned by the Houston Co.

Amigo—The new mines on the Stone Coal Extension of the Virginian R.R. are being delayed considerably by lack of electrical equipment, sub-stations, etc.

Majestic—On the night of May 24, fire destroyed the tipple and coal conveyor at the Majestic Collieries Co.'s plant here. The conveyor was a Link-Belt flight conveyor 600 ft. long which brought the coal down the mountain from the screen house to the tipple. The fire is believed to have been of incendiary origin and the loss about $30,000 fully covered by insurance.

OHIO

Martins Ferry—It is said that the last regular pay of the miners throughout this region was the greatest that has been received since the miners went on strike in April 1914. This is partly because of the great amount of time the miners are getting since the lake trade opened, and partly because of the increase in wages which the men have been receiving since April 1.

Lisbon—The West Pittsburgh mines near Teegarden recently resumed work after a shutdown of three weeks. The mines were closed for lack of orders, but the 80 men recently returned to work with prospects of steady operation of the mine.

Columbus—James H. Pritchard, Chief Deputy and Safety Commissioner of Mines of Ohio, has started a movement to prohibit shooting without first "snubbing." In several of the mining districts of the state, notably eastern Ohio and the Hocking Valley, the agreement on working conditions absolutely compells all loaders to snub before shooting. In other districts the provision is not contained in the working agreements and consequently the practice is not followed. It is claimed by Mr. Pritchard that for the safety of the miners, "snubbing" should be compelled and if the Ohio Industrial Commission upholds his stand he will send out such a mandate soon.

Two of the mines of the Continental Coal Co. have been placed in operation by the Continental Mining Co., which is headed by George M. Jones, of Toledo. Receiver Monsarrat of the old company is now busy placing other mines in condition for operation. It is believed that about 8 of the 13 mines in Ohio will be in operation within six weeks.

Corning—The Ohio mining department has opened the mine of the Corning Mining Co., which was sealed up several months ago following a fire. It was found that the fire was extinguished and the mine will be placed in operation soon.

Wellston—About 200 mines employed by the Superior Colliery Co. at mine No. 11 near Wellston struck recently because of the company's refusal to pay for the removal of "bug dust." The men demanded pay for the work and the company standing on the New York agreement refused. Clause No. 6 of the McAlpin agreement provides that nothing shall be done to increase the cost of production above the normal increase and if pay is given for the removal of "bug dust" it would increase the cost of production. Efforts are being made to settle the trouble.

ILLINOIS

Springfield—Announcement is made that the State Miners' Board will hold meetings in June as follows: Spring Valley, June 6; New Baden, June 12; Belleville, June 13; Staunton, June 17; Eldorado, June 20; West Frankfort, June 21; Herrin, June 22; Duquoin, June 23; Springfield, June 27; Taylorville, June 28.

Duquoin—The annual meeting of the Illinois Mining Institute, with a membership of nearly 1,000 was in session here for three days recently. The delegates were given an automobile trip to the mines of Franklin and Perry Counties, including the Majestic, Security and Paradise mines and to the Ziegler district colliery at Christopher. They were guests at dinner of Frank Urbain, general superintendent of the United Mining Co. at Christopher. On the return to Duquoin a banquet was tendered them in the St. Nicholas Hotel. John P. Reese, of Gillespie, president of the Superior Coal Co., was toastmaster.

Belleville—Joseph Taylor, a coal operator of Belleville, has submitted to the Commercial Club a proposition for tunneling under the city by removing the coal strata for the purpose of diverting part of the flow of Richland Creek and preventing floods. Mr. Taylor is willing to assume the work of driving the tunnel through for the sake of the coal which would be removed.

OKLAHOMA

McAlester—The Rock Island Coal Mining Co. mine No. 40 at Gowen, Okla., turned out in one day this week what is

claimed to be the largest amount of coal ever mined in one day either by an Oklahoma or Indian Territory mine. In the eight hours a total of 1,384 tons of coal was mined and loaded on railroad cars at this mine.

PERSONALS

W. A. Wilson, formerly manager of the Lynn and Allburn Coal companies, has accepted the position of General Manager of the Thacker Coal and Coke Co.

E. C. Mahan, general manager of the Southern Coal and Coke Co., has been spending some time at Boca Grande, Fla., and was successful recently in landing a 100 lb. tarpon.

F. H. Clymer, for 10 years superintendent of the Roane Iron Co., at Rockwood, Tenn., recently tendered his resignation. Efforts were made to have him reconsider this step but he declined to do so.

J. W. Dawson, a coal operator of Charleston, was recently appointed by Governor Hatfield to membership on the State Virginia Debt Commission. Other members of this commission are W. E. Wells, W. T. Ice, Jr., F. J. Miller.

Harry W. Mountz, chief mining engineer for the Lehigh Valley Coal Co. has been appointed a member of the Wilkes-Barre Planning Commission by resolution of Councilman Joseph G. Schuler. Mr. Mountz's appointment is for a term of 5 yr.

W. H. Adams has been appointed assistant general manager of the Crozer-Pocahontas Co. Mr. Adams has been identified with the Philadelphia office of the coal company since it was established. J. I. Tirney, general sales manager of the company is looking after the Western trade.

Thomas Keith Jenkins has been appointed sales manager for the Emmons Coal Mining Co., with offices in the Land Title Building, Philadelphia. Mr. Jenkins is well known to the trade and has been identified with the coal trade for a number of years. He formerly was connected with the Davis Coal and Coke Co., and later with B. Nicoll & Co.

George E. Henry, owner of the mines of the Keystone Coal Co., was badly injured at the Sarah Furnace mine of the company on the Allegheny River a few days ago. While making a bad turn his automobile went over the bank, overturned and pinned him under it. He was apparently injured internally and was taken to a hospital in Pittsburgh.

OBITUARY

T. S. L. Basore, 50 years of age, assistant purchasing agent, of the Tennessee Coal, Iron and Railroad Co., died recently in Birmingham, Ala. Mr. Basore, is survived by his widow, three sons, and his father.

Richard M. Freeman, 74 years of age, and a Veteran of the civil war, died at his home in Bicknell, Ind., recently of diabetes. Mr. Freeman was a coal operator and known as the father of the coal industry in southern Indiana. Mr. Freeman is survived by his widow, four sons, and two daughters.

RECENT COAL AND COKE PATENTS

Soot Extractor for Boilers. E. J. McCarty, Clinton, Mass. 1,179,202 Apr. 11, 1916. Filed May 9, 1912. Serial No. 696,067.

Mine Door. A. J. Johnson and P. Blessant, Stonnington, Ill. 1,179,321 Apr. 11, 1916. Filed Sept. 3, 1915, Serial No. 48,855.

Apparatus for Feeding Pulverized Fuel. C. J. Gadd, Lebanon, Penn. 1,178,087 Apr. 11, 1916. Filed Mar. 12, 1914. Serial No. 824,091.

Safety Catch for Mining Cages. J. T. Pero and L. P. Jones, Parsons, Penn. 1,178,942 Apr. 11, 1916. Filed June 11, 1915. Serial No. 33,531.

Forced Feed Furnace Grate. L. H. Simmons assignor to Simmons Forced Draft Co., Goldsboro, N. C. 1,178,274 Apr. 4, 1916. Filed Nov. 29, 1915. Serial No. 64,109.

Furnace Equipment. J. Kerch, assignor to 20th Century Heating and Ventilating Co., Akron, Ohio. 1,177,779 Apr. 4, 1916. Filed Oct. 20, 1915. Serial No. 56,968.

INDUSTRIAL NEWS

St. Clairsville, Ohio—The capital of the Troll Coal Mining Co. has been increased from $50,000 to $170,000.

Pottsville, Penn.—The celebration to mark the winning of the 8 hr. day by the miners in the anthracite region has been postponed until next April.

Pikeville, Ky.—The Federal Coal Co. has been organized with a capital of $50,000. The incorporators are T. R. Preston, M. S. Barker, F. B. Martin and A. G. Stith.

Jackson, Ohio—The Jackson Colliery Co. has been incorporated with a capital of $10,000 to mine and sell coal by J. M. Armstrong, Sherman Walker, David Armstrong, Joseph Armstrong and John P. McDonald.

Kalispell, Mont.—A Spokane syndicate, headed by A. Worth Beldon, has been formed to open up 100 sections of coal land in the Flathead Valley and British Columbia. The new syndicate will issue bonds for $4,000,000 on coal land grants.

Philadelphia, Penn.—On June 1 the schooner Jane Palmer completed a one-year charter for carrying coal to coast points at 70c. per ton. The owners have now entered into a new contract which will give them a rate several times larger than this.

Washington, D. C.—On the appeal of the Philadelphia & Reading Coal and Iron Co. the U. S. Supreme Court recently declared unconstitutional an act whereby the State of Wisconsin sought to bar the coal company from transacting business in that state.

Gassaway, W. Va.—The Blue Ridge Coal Co. of Pittsburgh, Penn., will open up mines near here in the near future. This company recently purchased from C. E. Mollohon, of Heaters, 1,200 acres of coal, and will probably get 900 more on Otter Creek, all of which will be operated.

Elkins, W. Va.—The Inter Mountain Coal & Lumber Co., with chief works in Kentucky, has been organized; authorized capital, $500,000. The incorporators are Charles S. Robb, of Washington, D. C., D. L. Strock, D. V. Mayes, N. I. Hall, of Elkins, and Merritt Wilson, of Wildell.

Huntington, W. Va.—The Kentucky Byproducts Coal Co., with main office here and main works on Pond Creek, has filed articles of incorporation. The capital stock authorized is $250,000, and the incorporators are Z. T. Vinson, Donald Clark, E. P. Frost, E. M. Watts and E. E. Bush.

St. Louis, Mo.—More than 5,000 persons visited the United States Government Safety-First Exhibit train in the two days that it stopped here. The exhibit of the Mine Bureau, including equipment for the prevention of accidents in mines and for rescue and first aid, attracted the most attention.

Whitesburg, Ky.—The South East Coal Co., operating at Seco, in the Boone's Fork coal field, will shortly start the development of a new plant near the mouth of the Millstone on the main line of the Louisville and Nashville R.R., where a mining town will be built and five or six mines opened.

Norfolk, Va.—Coal shipments over the Chesapeake & Ohio R.R. increased during April 490,609 tons as compared with the same month of 1915, with a total tonnage of 2,159,688 tons. For the ten months ending with April the increase amounts to 4,395,996 tons, with a total movement of 21,582,113 tons.

Northfork, W. Va.—The construction crew of the Link-Belt Co., of Philadelphia, will shortly begin the erection of a $90,000 steel tipple for the Powhatan Co. When completed this tipple will be one of the best equiped and most modern in the Pocahontas field which contains many large and costly tipples.

Island, Ky.—Preparations are being made for beginning of operations here by the Justright Coal Co., which has been organized by 14 practical miners who have 150 acres of good coal land. R. Clark is president and Luther Andrews secretary, while F. A. Lochry has been engaged in perfecting titles, making leases, etc.

Chattanooga, Tenn.—The assets of the Continental Coal Corporation are to be purchased by the Federal Coal Co., now in process of formation. The largest bondholders are F. B. Martin, Theodore Harris Estate, Louisville, Ky., J. B. Carroll, administrator, John H. Drew, of Tampa, Fla. and H. M. Winslow, of Harriman, Tenn.

New Haven, Conn.—The embargo committee of the Eastern Freight Accumulation Conference has lifted the embargo on all coal through Belle Dock, New Haven, on the New York, New Haven & Hartford R.R., and upon bituminous coal to the extent of 33 per cent. of the average daily receipts from each connecting rail line during May, 1915.

Clay, W. Va.—The Elkland Co. has been organized to deal in land, coal, oil, gas and other minerals, and to mine, drill, produce, refine, transport and deal in all of these commodities. The authorized capital stock is $45,000, held by M. M. Price, of New York City, C. L. Voglesang, O. L. Hall, Mary A. Voglesang and Fanny L. Hall, of Clay Court House.

Boston, Mass.—The two lake steamers, "Harvey Brown" and "Selwyn Eddy," recently purchased by the Darrow-Mann Co., of this city, for use in the coal trade to New England ports, have been cut in halves at Buffalo. At Montreal they will be jointed together and then proceed to Boston. They are expected the middle of this month.

Pottsville, Penn.—The Philadelphia & Reading Coal and Iron Co. has announced that the 800 employees at its Pottsville repair shops will hereafter work only 9 hr. for a day's wages, instead of 10 hr. An additional concession of two hours is made on Saturdays. The company also announced that a raise in wages has been granted to all machinists, effective immediately.

Bluefield, W. Va.—It is stated that the coal operators of the Guyandotte Valley have met the minimum tonnage guarantee of 3,000,000 tons eastbound per year demanded by the Virginian R.R. as a condition to build an extension to tap the Logan field. A committee has been named to confer with the Virginian, and coalmen are hopeful that the road will make the desired extension.

Birmingham, Ala.—An order for 175,000 tons of coal to be delivered within two years in about equal monthly installments has been given the Birmingham Fuel Co. by the Southern Pacific R.R. This contract became effective June 1, and deliveries amounting to about 7,500 tons per month will begin immediately. The coal is to be shipped to New Orleans for the use of trains on the Southern Pacific west of that city to the oil fields.

Huntington, W. Va.—A jury in the Circuit Court recently returned a verdict for the plaintiff in the case of George T. Lucas, against Robert Ansley and the United States Coal and Oil Co., giving Mrs. George T. Lucas, widow, a deed to a disputed tract of land in Logan County valued at approximately $1,000,000. It is stated that an appeal will be taken to the Supreme Court of Appeals—This case has been pending in the courts for years.

Huntington, W. Va.—Francis B. James and E. E. William,-son, of Washington, D. C., who represent the West Virginia Splint and Gas Coal Association before the Interstate Commerce Commission, recently made a tour of inspection of the Guyan Valley, Paint Creek and Cabin Creek coal districts. These men are engaged in getting first hand information as to the cost and methods of assembling and transporting coal to the Lakes and Northwestern Market.

Philadelphia, Penn.—There was an increase of 521,208 tons in the bituminous shipments of the Pennsylvania R.R. for the month of April, 1916, with a total tonnage of 3,879,270 tons. Coke showed an increase of 421,985 tons, with a total of 1,-254,412 tons, while anthracite shipments amounted to 766,540, which was a decrease of 300,150 as compared with the same month last year. The total fuel shipments for the month amounted to 5,900,222, an increase of 743,193 tons.

Pottsville, Penn.—The Supreme Court, in an opinion handed down on May 27, approved the award of $3,500 to Joseph Kiorkosky for injuries received by the kick of a mule. The Kaska William Supply Co. was the defendant and Kiorkosky, a boy, was not employed at either the store or the colliery, the lower court ruled that it was the duty of the company to keep boys away from their mules. The boy was permanently injured, his teeth being knocked out and his jaw fractured.

Little Rock, Ark.—The Collier-Dunlap Coal Co. and the Oklahoma Oil and Gas Co., both Clarksville concerns, filed articles of incorporation with the secretary of state recently. Each company has a capital of $50,000. The incorporators of the coal company are R. D. Dunlap, W. F. Collier, W. Ward Dunlap and W. W. Collier, and those of the oil and gas company are Frank Engles, J. J. Craven, H. C. Miller, Arthur Lawrence, Fred E. Adams, T. J. Burns and G. O. Patterson.

Whitesburg, Ky.—The Virginia Iron, Coal and Coke Co. has started the initial work on the development of the old Roberts coal and timber land tract on Guests' River in Wise County, Va. The company is building an extension of the Interstate R.R. six miles onto the property from Norton. A model town is planned with the opening of four or five mines and the installation of at least two good-sized sawmills to develop the forests. This will be one of the largest operations in the Virginia field.

Wilkes-Barre, Penn.—F. M. Chase, general manager of the Lehigh Valley Coal Co., has appointed Howard Weimer as forester of the Wyoming Valley Water Supply Co. of Hazleton. This is considered to be the first step in a move to establish a permanent forester in the employ of the Lehigh Valley Coal Co. The coal company intends to plant 50,000 trees along the watershed of the water company, and at present the work will be entirely in the interest of the water company. This firm is a subsidiary of the coal company.

Rockville, Penn.—The Susquehanna River fleet appears to be moblized, and if the number and activity of the dredges and accompanying steamers and flats are anything to go by there must be a large amount of coal and sand awaiting removal. The river conditions were not satisfactory for early work this year, and the rivermen had to spot the places where coal and sand gathered as the wide branching stream has many currents which are liable to pile up $100 worth of sand or $500 worth of coal in less than a week.

St. Louis, Mo.—One of the most important events in the local coal world during the past week was the meetings of the 5th and 9th district operators, the object of which is to form an association. As yet the organization is a tentative one, but it is confidently expected that much good will come of it. Temporary advantages that are sometimes to be had by operators who demoralize the markets are dearly bought in the long run. This association is designed to overcome this tendency of some of the operators. Methods are now being discussed with this end in view.

El Paso, Texas—Coal mining operations in the Willow Creek district in New Mexico have been started by George C. Benedict and his associates of New York, who recently purchased the Willow Springs property from Mrs. Harriett McIvers, the only woman mine operator in New Mexico. Operations in the district will be carried on on a large scale, it is announced, and already extensive improvements have been begun. The same syndicate is negotiating for possession of the large iron ore deposits in the Oscuro Mountains near the coal beds, to be operated in conjunction with the coal mining.

St. Louis, Mo.—The Interstate Commerce Commission has issued an order authorizing the Southern Ry., without observing the long-and-short-haul clause, to establish a rate on mines in Illinois on the Southern road to Festus, Crystan Junction and Herculaneum, Mo., the same as the rate contemporaneously maintained from mines on the Illinois Central to Crystal City via Coulterville, Ill., the Illinois Southern Ry., Ste. Genevieve, Mo., and the Frisco R.R. The order includes authority to establish a rate from Indiana mines to the same destinations on the basis of 15c. higher than the rates from Illinois points.

Toronto, Canada—Mark Workman, president of the Dominion Steel Corporation, who has returned to Montreal after an inspection of the properties of the company at Sydney, N. S., states that the company's coal business is handicapped by various difficulties, the chief of which is that it has scarcely any steamer tonnage to transport its output, the majority of the vessels having been requistioned for war purposes. In normal times the company at this season would be shipping large quantities of coal up the St. Lawrence to Montreal, but under present conditions it is difficult to see how it can fulfill its obligations to customers in that district, among whom are many munition factories.

Harrisburg, Penn.—The state commission to investigate the rise in the price of anthracite coal following the coal tax will make efforts to ascertain why middlemen and retailers have not returned charges made for the tax to consumers. This was announced following a conference of the commission with Attorney General Brown on May 25. The commission discussed its investigations, which are said to have shown that many operators have returned what they charged for the tax after it had been declared unconstitutional, one company alone returning $500,000. The information received, however, said Chairman Gawthrop, was that the consumers had not had the increase returned to them by the persons, firms or corporations from which they purchased. The commission will shortly begin hearings and is carrying on a series of investigations.

Pittsburgh, Penn.—All classes of creditors of the United Coal Co., and subsidiary companies, the Pittsburgh & Baltimore Coal Co. and Naomi Coal Co., of Pittsburgh, Penn., operating six large mines in Fayette, Westmoreland, Allegheny and Washington counties, which together with the Somerset Smokeless Coal Co. and Merchants Coal Co., other subsidiaries, have been in receivers' hands for the past two years have agreed to a plan of reorganization, whereby the properties were to be sold on May 23. It is the intention of the parties at interest to organize a new company, the United Coal Corporation to take over these properties, together with the Jenner-Quemahoning Coal Co., operating a large mine in Somerset County, and operate them all as one company. These mines are located variously on the Baltimore & Ohio, Pittsburg & Lake Erie and Pennsylvania railroads.

Market Department

General Review

Anthracite circulars subject to much cutting. Bituminous spotty but with a continued good outlook. Labor disturbances in the Pittsburgh district assuming alarming proportions. Middle Western market steady, particularly on the steam grades.

Anthracite—The new anthracite circulars are being cut liberally in all directions, and shippers are hard pressed to keep coal moving and avoid demurrage charges. The spring buying has seldom, if ever, been on such a small scale. Consumers are undoubtedly impressed with the general slashing of the company's circulars, and are holding off in anticipation of further reductions. Evidence of the poor demand is seen in many directions; one of the largest companies for instance, has suspended operations for a period of three weeks, pending the adjustment of labor difficulties, with its tonnage having apparently not been missed in any way. The price cutting has even spread to contract business on which some moderate concessions are noted. It is clear that the numerous disturbances in the anthracite trade this spring will make the accumulation of the usual supplies impossible, and the trade is already beginning to look forward to an unprecedented fall business.

Bituminous—The demand is quiet but shippers maintain their confident attitude as regards the future, and there is no attempt to urge sales. The strikes in the Pittsburgh district in Pennsylvania are being watched with much interest on the Seaboard, and have already had a stimulating effect on the market. The export trade is also once more looming up as a potent factor in the situation; foreign inquiries are more numerous and of a more pressing nature, while the shipments off shore are doing considerable to relieve the pressure on the domestic market. The transportation situation to down east points is materially improved and now about equal to the demand, but were the buying to show any material increase the roads would again be swamped. As a general thing the market is inclined to be spotty and is awaiting some further definite developments in industrial circles.

Lake Trade—The development of an acute situation in the labor difficulties in the Pittsburgh district has produced a mildly chaotic condition there. The strikes have caused a heavy decline in production, throwing some of the large steel consumers into the open market for their requirements, with a consequent sharp stiffening up in spot prices. The situation is very uncertain at the moment, hinging entirely on the prospects for an adjustment and a continuance of mine suspensions for a few days further, may result in an acute situation. With ore shippers offering record high rates for vessels, coal men are hard pressed to obtain boats, particularly to other points than the ore shipping docks. However the movement in that direction is more steady, while the situation at the upper ports is good, and the movement to the interior active. Most of the contract business has now been covered, but there is still some negotiations at good prices. Speculative coal is much in evidence but is much better absorbed than formerly.

Middle West—The accumulated stocks of the large consumers are being reduced more rapidly and the market is slightly firmer, particularly as regards screenings. In the domestic trade, however, there is considerable pressure to sell lump coal which has attained to such proportions in some instances that record low prices have been accepted to move coal although this is by no means the rule. Advances in price schedules effective the first of the month and considerable activity in contract negotiations were among the features of the week's development. An announcement by some companies that the then prevailing figures on contracts would be withdrawn on the last day of the month stimulated a mild rush to cover among more conservative consumers. With the Lake trade now absorbing a considerable proportion of the Eastern tonnage there has been a broadening out in the market for the Middle Western coal which has been further accentuated by higher prices at the upper Lake ports due in part to increased vessel rates.

A Year Ago—Anthracite continues to slow down and price cutting becoming more general. Bituminous agencies are still optimistic though concern is felt over the prevailing low prices.

Business Opinions

Boston News Bureau—There is really little in the situation at the moment that could be called sensational. There are no decided changes either at home or abroad. On June 7 comes the Republication Presidential Convention. With the nomination of a candidate that people can support with enthusiasm, and a harmonious agreement between the progressives and the old guard republicans, sentiment should improve much. But until we reach that point, both general trade and speculation are likely to contract. People are thinking today more than they are acting. We are halting, so to speak, and marking time. In the meantime, there are no special adverse features. Crops are growing and so far as one can see, all is well.

Iron Age—It appears that as the pressure of new domestic business at premium prices relaxes, foreign inquiry increases. The fact is that buyers abroad, apart from those placing war orders, want to restock, but not at famine prices and now that freights have come down from such impossible figures as $42 on pig iron to Italy, they are trying to do business. Pig-iron inquiry for Italy and France, long inactive, is being revived, and there are large foreign inquiries for tin plate and barb wire. Russia's requirements of the latter are put well above 100,000 tons, but in this, as in other export negotiations, there are evident duplications. There is an Italian offer on 10,000 tons of rail blooms, and France's large rail orders have just been increased by 350,000 tons, taken by an Eastern mill.

Dun—Continuing remarkably prosperous, business has gained in wholesome characteristics through the recent cessation of price advances in certain commodities. Sustainment of consumptive demands in unprecedented volume with costs rising rapidly has been an economic phenomenon for months past, but that ultimately a point would be reached at which buying would slacken was obvious. Evidences of abatement are by no means general and nothing indicates diminished purchasing power, yet in branches where forward requirements are already largely provided for some hesitation, with shrinkage in new orders, is natural. Commercial failures this week in the United States are 314 against 348 last week, 335 the preceding week and 385 the corresponding week last year.

Bradstreet—While the country's industries continue to operate at high speed, there are numerous evidences of a reaction toward conservatism in buying, the trend thus displayed suggesting that, for the time being at least, new business has undergone a slight paring down, and that buying power has been temporarily satiated or represented in order to permit of a breathing spell. Over all, however, is the fact that business, industrial and commercial, has been such as to fill order books to a point where a lifting of the strain is welcome.

Dry Goods Economist—Economist staff-members who have visited various sections, including the Middle West, this week report a continuance of activity among retailers, with merchants and department heads very optimistic as to the future. These conditions are reflected in the manufacturing and wholesale centers in so far as some lines of goods are concerned, but in other lines the continuance of cool weather is charged with having checked reordering.

Marshall Field & Co.—Current wholesale shipments of dry goods have been in larger volume than for the corresponding period of 1915. Road sales for immediate delivery show a handsome increase over the same week a year ago. For fall delivery they continue strong, running about the same as the corresponding period last spring. Customers have been in the market in much larger numbers than during the same week last year. Collections are normal.

American Wool and Cotton Reporter—The embargo which England has placed on merinos from Australia has occasioned dealers in Boston some discussion. As is well known there is already an embargo on cross-breds from Australia and the recent ones shuts out all Australian wools from coming to this country. The report of the embargo caused some speculation in the Boston market. It is felt that this is not a particularly favorable time for the dealers for such an embargo to be declared, for not much wool has been purchased in the West.

ATLANTIC SEABOARD

BOSTON

Market for Hampton Roads coals continues dull, except for export. Georges Creek arrears due to lack of transportation. Pennsylvania grades easy. Anthracite demand strong.

Bituminous—There is no change in the dullness of the market and no near prospect of relief. Were it not for offshore trade most of the Pocahontas and New River agencies would be pressed to move coal. As it is, there has been a scaling down of f.o.b. prices for spot coal, but so far with little result. A few more colliers transferred from the Lakes will help out the supply of transportation and possibly induce some buying. There is so strong an opinion now that marine freights will rule high that any concession would probably move some extra coal to New England.

At the disturbing points here the supply is also easy. Prices follow closely the current f.o.b. basis plus water freight and charges, with only a quiet market. At Providence the car service is just about equal to the demand; were the buying power nearer normal the railroad would be swamped. The pressure, however, is less all along the line, owing more than anything else to reduced fuel consumption. Cases of congestion at points like New Haven where an influx of water coal was due to the lack of service all-rail are now practically cleared up.

Quite a volume of coal remains to be purchased this season and it will be very interesting to watch developments. There is some quiet buying in process now but for small tonnages rather than large. Enough transient inquiry is in evidence to show that good-sized consumers are keeping in touch with the market.

No change is apparent in Georges Creek. Slow movement and a somewhat reduced fleet accounts for the shippers being still slightly in arrears on contracts. Shipments all-rail are on a percentage basis, the railroads accepting only a proportion of the normal tonnage to come through.

Steam grades from Pennsylvania are now very quiet at prices ranging from 15@25c. up from a year ago. Several shippers are now suffering from a shortage of boats at Philadelphia and a curtailed service all-rail instead of the shortage of miners that was so much the prevailing situation a month ago. Inducements are being made to consumers to take on coal while there is a chance to get it, and sales agents are profiting mildly by the widespread belief through this territory that next fall or winter will see a worse tie-up than was the case last year. On some of the roads the movement is now much improved; on others coal is allowed to come through only in moderate quantities. Shippers still show a wholesome dread of season contracts as well as delivered prices. Some parts of this territory, such as eastern Maine, are just now waking up to the difficulties of getting coal forward.

Anthracite—The inconsistencies in the recent circulars issued by the different hard-coal companies are now straightened out and June will probably see the trade settling down to the market that ordinarily prevails here during April. The fact that dealers are taking on coal two months late in most cases is almost sure to make a steady demand for barge coal for the balance of the season. In some cases shippers are declining to name alongside prices on the junior sizes and it looks as if the barge lines would have their hands full to deliver their usual quota. With some companies practically withdrawn from this territory, an extra burden is thrown on others, particularly those shipping from Philadelphia, and that is a further reason for relatively light receipts during June and heavier tonnages in July and August than has been the rule.

A heavy demand is developing for broken coal, particularly among gas companies. Egg and chestnut sizes are expected to increase somewhat in request this year on account of the new price differential. It is apparently settled now that rice and barley sizes will no longer be kept separate.

Retail demand is good and advances are looked for July 1. The remarkable thing is that so little adverse comment is heard on the increase in price over last year.

Bituminous at wholesale, f.o.b. loading ports at points designated, is quoted about as follows:

	Philadelphia	New York	Baltimore	F.o.b. Mine
Clearfields	$2.30@2.80	$2.65@3.10	.....	$1.05@1.55
Cambrias and Somersets	2.60@3.00	2.90@3.25	.....	1.35@1.75
Georges Creek (contract)	3.07@3.17	3.37@3.47	$3.00@3.10	$2.00@2.10

Pocahontas and New River are $2.70@2.80, f.o.b. Norfolk and Newport News, Va., and $4.85@5 on cars at Providence and Boston.

NEW YORK

Holiday spirit invades market and dealers rest. Anthracite situation dull. No rush to place orders to save monthly increase. Bituminous market quiet, but prospects bright. Prices firm.

Anthracite—The anthracite market continues sluggish. There is no activity and little interest is being shown by retailers and consumers. Usually the last week in the spring months show some activity in the placing of orders to save the ten cents per ton advance but no increase of orders was noticeable in the month just closed. Consumers are not stocking up and are not inclined to take advantage of whatever reduction they can now get from winter prices. There is a feeling that the companies will make another change in prices and many of them are following in the footsteps of wholesalers, selling coal subject to future adjustment.

The situation at the New York docks has been relieved by the lifting of embargoes on hard-coal deliveries to New England and shippers feel easier.

Considerable is heard about price cutting. Concessions of from 10 to 25c. have been made by individuals on certain of the prepared sizes. Some shippers are kept hustling to move coal and are frequently forced to cut prices to save demurrage charges.

The steam-coal situation is uncertain. There is considerable confusion as to sizes. Some individuals continue to ship rice and barley, and there is considerable of the new "boiler" size being shipped by the companies. Owing to the curtailed production the supply of steam coals is not large while prices are fairly strong and very little cutting is noted. Some individual lots of pea coal have sold at 10c. off, but only to save demurrage charges. No contracts are being closed for buckwheat No. 1, buyers expecting to be able to pick up bargains later. Rice and barley are firm.

Current quotations, per gross ton, f.o.b. tidewater, at the lower ports, are as follows:

	Circular	Individual		Circular	Individual
Broken	$4.95	.....	Pea	$3.50	$3.40@3.50
Egg	5.15	$5.05@5.15	Buck	2.75	2.65@2.75
Stove	5.40	5.30@5.40	Rice	2.25	2.20@2.25
Nut	5.45	5.35@5.45	Barley	1.75	1.70@1.75
			Boiler	2.20	

Quotations at the upper ports are generally 5c. higher on account of the difference in water freight rates.

Bituminous—There is very little activity in the bituminous market. Demand is slow but there appears to be no urgency on the part of sellers to get rid of their supply. Wholesale dealers firmly believe that within the next few weeks business will be stronger and prices higher. Embargoes have been modified and are not as restrictive as a few weeks ago but Eastern shipments continue to be greatly curtailed and much coal that under ordinary conditions would be sent Eastward is coming here.

The labor situation in the Somerset region as well as in West Virginia and along the Western Maryland is better. Central Pennsylvania operators are carefully watching the Pittsburgh situation, and look for improved conditions should the labor troubles there continue for any length of time.

Many quotations are heard in this market. Much depends upon the grade wanted and the quickness of delivery. Contract coals are moving freely. Exporters report increased inquiries and demand. Shipments to South American points are greater. As usual many inquiries for prices have been received from European countries but shipments are few.

Current quotations, f.o.b. per gross ton, New York tidewater, for various grades follow:

	South Amboy	Port Reading	St. George	Mine Price
Georges Creek Big Vein	$3.50@3.60	$3.50@3.60	$3.50@3.60	$1.95@2.05
Georges Creek Tyson	3.10@3.25	3.10@3.25	3.10@3.25	1.60@1.80
Clearfield: Medium	3.00@3.10	3.00@3.10	.....	1.45@1.55
South Forks	3.25@3.50	.....	.....	1.70@1.95
Nanty Glo	3.00@3.10	.....	.....	1.45@1.55
Somerset County: Medium	2.90@3.00	2.90@3.00	2.90@3.00	1.35@1.45
Quemahoning	.....	3.00@3.10	3.00@3.10	1.45@1.55
West Virginia Fairmont	.....	2.80@2.90	2.80@2.90	1.00@1.10
Fairmont mine-run	.....	2.70@2.80	2.70@2.80	.90@1.00
Western Maryland	.....	2.55@2.60	2.55@2.60	1.10@1.20

PHILADELPHIA

Little demand for anthracite. Price cutting general. Complaints of preparation. New price circular issued. Bituminous remains quiet and prices unchanged.

Anthracite—Present trade conditions are a disappointment, but are just about as predicted by the selling agents. One of the big companies has had practically all its mines shut down for three weeks due to labor troubles and yet does not miss the tonnage. It certainly is an unusual spring, and the fact remains that there is no demand for coal.

The larger companies, those particularly who issue circulars, came out on June 1 with their new prices, wherein the

discount on egg, stove, nut and pea coal was reduced to 30c. per ton. However, at the present time the only purpose served by the circular seems to be a starting point from which to cut prices, for after working but a few weeks since the May circular was issued the prices have been cut by the shippers.

Buckwheat was probably the first size to be affected and the circular price of $1.65 appears to be a joke with the larger buyers of this grade. We know that some tonnage of this size was moved last week at as low as $1.30. While the contract figure is $1.50, there is more than one instance where contracts have been signed to the end of next March at $1.40.

Pea is already causing the trouble anticipated. Sales have been made at $2.25, which is a concession of 15c. from May circular and 25c. from June, and it would not be surprising to hear that even the big companies have protected their important buyers with blocks of this size until September at a price not much above this figure. We know of collieries where from 20 to 30 cars are standing on demurrage and the price will have to be sacrificed or the collieries shut down.

Egg coal has been cut 15c. to 20c. and is predicted to go lower. The largest buyers have been able to strike bargains on stove and chestnut at prices from 10c. to 20c. off circular.

As to the contract business, the companies are experiencing some difficulty in closing the business as promptly as they would wish. The information as to price cutting promptly reached the buyers of steam coals and as many of them laid in extra heavy supplies in anticipation of a suspension, they are in a position to postpone their decision as to new contracts, which many of them are doing in anticipation of getting a better figure later.

Aside from the new "boiler" coal, no shipper can be found who will admit that anything has been done toward changing the sizes. However, it is becoming very noticeable that much poorly prepared coal is coming into market. Complaints are numerous, many cars having been refused by the original consignees, and it is strongly rumored that the same care is not being given to preparation. A number of cars of chestnut have been reported as containing too great a percentage of pea, and pea with too great a proportion of buckwheat. Most of the companies will continue to ship rice and barley coal, but it can be stated on good authority that it is the ultimate intention to abandon these two sizes entirely just as soon as the trade is properly educated to use the new "boiler" fuel.

The prices for June, which are ten cents higher than for last month, per gross ton f.o.b. mines for line shipment and f.o.b. Port Richmond for tide are as follows:

	Line	Tide		Line	Tide
Broken	$3.60	$4.75	Buckwheat	$1.65	$2.55
Egg	3.85	4.95	Rice	1.00	....
Stove	4.10	5.20	Boiler	.90	1.80
Chestnut	4.20	5.25	Barley	.75	....
Pea	2.50	3.40			

Bituminous—Probably the most interesting news about the bituminous trade is that the business is better than last year at this time. Even at that there is no particular activity. Some shippers report an increase in new business for the week, but others state that their trade is less active; the market is spotty and awaiting a general improvement, which all agree is certain to come. There is no particular complaint as to deliveries within the city, although some of the piers continue to be embargoed. The outside rail situation shows no sign of improvement, and the business is dominated entirely by the lack of labor at the mines and the inability of the railroads to make prompt deliveries of the coal after it is loaded.

Prices continue practically unchanged, as they have been for the past two months, and are about as follows, per gross ton f.o.b. cars at mines:

Georges Creek Big Vein	$1.90@2.00	Fairmont gas, ¾	$1.50@1.60
South Fork Miller Vein	1.70@1.80	Fairmont gas, mine-run	1.35@1.45
Clearfield (ordinary)	1.35@1.45	Fairmont gas, slack	.95@1.00
Somerset (ordinary)	1.30@1.40	Fairmont lump, ordinary	1.15@1.25
West Va. Freeport	1.15@1.25	Fairmont mine-run	.95@1.05
		Fairmont slack	.90@1.00

BALTIMORE

Strike troubles in the Pittsburgh district advance gas-coal prices. Steam fuels in poor demand. Exports medium. Anthracite movement light.

Bituminous—The most exciting feature in the local coal market is the labor troubles in the Pittsburgh district that early in the week closed a large number of mines. In a few hours many inquiries for fuel poured in on the Fairmount operators and prices began to stiffen. The surplus production that existed even after the Lakes opened was rapidly absorbed.

Steam coals are not over active. Some of the less desirable grades fell off due to congestion at this and other Eastern points. Better grades are firm, however, on both contract and spot sale.

Prices to the trade at the mines were about as follows: Georges Creek Tyson, $1.75; Miller vein, $1.50; Quemahoning, $1.60; Somerset, $1.50; Freeport, $1.15; Fairmont gas, three-quarter, $1.10 to $1.15; same, run-mine, $1 to $1.05; slack, $1.00.

Anthracite—The market has been listless. Some little demand is noted for smaller sizes, but the majority of ordering for storage is being withheld until next month, when the low price schedule will be in effect.

HAMPTON ROADS

Railroad Tonnages—Dumpings over the local piers for the past five weeks compare as follows:

	Week Ending				
Railroad	Apr. 29	May 6	May 13	May 20	May 27
Norfolk & Western	169,430	159,875	110,696	181,338	160,173
Chesapeake & Ohio	94,525	110,108	95,974	104,703	93,804
Virginian	57,675	58,846	95,198	95,799	79,268
Totals	321,630	328,829	301,868	381,840	323,245

Ocean Charters and Freights

OCEAN CHARTERS

Coal freight charters have been reported as follows:

NEW YORK				ATLANTIC RANGE			
Vessel	Destination	Tons	Rate	Vessel	Destination	Tons	Rate
Ohioan	R. Plata[1]			Jersey City	W. C. S. A.	2,955	
Adonia	St. John	315	$3.00	Clittertind	Arcangel	2,992	
Hight	St. John	467	3.00	Arna	S. Francisco	3,250	$8.50
VIRGINIA				**PHILADELPHIA**			
P. M. Brooks	Bermuda	343		Jethon	R. Janeiro	2,781	
E. S. Jones	Bahia	787	18.00	M. Thomas	Martinique	1,161	7.50
F. Howard	Azores	683		Ocland	Martinique	1,874	
W. M. Critchett	Bermuda	471	4.50	F. Brainard	Nassau	198	6.00

[1] Two round trips.

VESSEL CLEARANCES

The following steamers have cleared from various ports:

NORFOLK			BALTIMORE		
Vessel	Destination	Tons	Vessel	Destination	Tons
Messicano[12]	Genoa		Costes	Argentina	3,910
B. Hopkins[12]	St. Georges	331	Blanche	Italy	2,409
Ranvik[13]	Rio Janeiro	9,204	Nostra Assunta	Italy	1,900
Wellington[13]	Kingston	2,000	Berlin	Costa Rica	2,795
Darien Maru[12]	Annunziata		**PHILADELPHIA**		
Roddam[12]	Savona		Leonatus	Antilla	
NEWPORT NEWS			Jungshoved	Havana	
Juno[16]	Gibraltar		James T. Maxwell, Jr.	Gibara	
Tallac[4]	Santiago		Munorway	Havana	
			Sinaloa[4]	Cienfuegos	

[1] Atwater & Co.
[2] Baker Whiteley
[3] Barber & Co.
[4] Berwind-White
[5] C. G. Blake Co.
[6] Castner, Curran & Bullitt
[7] Chesapeake & Ohio C. & C. Co.
[8] Crozer-Pocahontas Co.
[9] Hasler Brothers
[10] Flat Top Fuel Co.
[11] New River Coal Co.
[12] Pocahontas Fuel Co.
[13] Smokeless Fuel Co.
[14] C. H. Sprague & Son
[15] Maryland C. & C. Co.
[16] White Oak Coal Co.

OCEAN FREIGHTS

A number of steamers were chartered during the past week to load coal, from United States ports to Rio, at $19.50 per ton net, with 1,000 tons per day discharge, and it is reported that the last fixture for this business was at $20 net. Additional steamers have been chartered for coals, from United States ports to West Coast ports, the last charters being at $15 per ton, with 500 tons discharge to good ports in Chile. Although a number of steamers have been chartered during this period to take coal to other destinations, none of these fixtures have been reported.

To	Rate	To	Rate
Havana	$4.50@5.00	Bermuda	$4.75@5.25
Cardenas or Sagua	6.25 about	Vera Cruz	6.00@6.50
Cienfuegos	6.00@6.50	Tampico	6.00@6.50
Port au Spain, Trinidad	7.00 about	Rio Janeiro	[4]19.50@20.00
St. Lucia	7.00 about	Santos*	[1]20.00@20.50
St. Thomas	6.50@6.75	Montevideo	20.40@21.60
Barbados	7.00 about	BuenosAires or La Plata	20.40@21.60
Kingston	6.75@7.00	Rosario	21.60@22.80
Curacao	[3]6.25@6.50	West Coast of Italy	33.60 about
Santiago	6.00@6.50	Barcelona**[5]	30.00 about
Guantanamo	6.00@6.50	Chile (good port)	[1]15.00
Demerara		Marseilles	32.40 about

* Consignees paying dockage dues. ** Spanish dues for account of cargo.

[1] 500 tons discharge. [2] 400 tons discharge. [3] And p.c. [4] Net, 1,000 tons discharge. [5] Or other good Spanish port.

W. W. Battie & Co.'s Coal Trade Freight Report.

COASTWISE FREIGHTS

For the few bottoms available for charter there is only a quiet demand, but rates are held to $2.25 for barges 2,000 tons or so from Hampton Roads to Boston. Steam colliers can probably be chartered at $2, from trip to trip. No increase in the number of boats is in sight except for a few steamers that are being brought from the Lakes. The refitting of these, however, will take months rather than weeks.

Barge rates on Long Island Sound from New York are still 80c.@90c.; $1 flat is being quoted for contract through to Apr. 1.

LAKE MARKETS

PITTSBURGH

Strike spread to about 75% of the union capacity of the district. Miners' convention produces no results to date. Some large consumers buying spot coal, with prices higher by about 30c. in the week.

The coal strike curtailed greatly the output of the Jones & Laughlin Steel Co. and it has been a large buyer of coal for a week. The Steel Corporation has also been a buyer to some extent, of Pittsburgh coal for a portion of its Pittsburgh requirements and of Ohio coal for part of its consumption in the Youngstown district. There has been relatively limited buying by other consumers, enough to advance the minimum on slack to $1.50 and on mine-run to $1.60 for steam and $1.75 for gas. Rumors that $2 has been paid are not confirmed, but a few days more of the strike may easily bring such a price. Many bids of $1.60 for ¾-in. Lake coal have been made and apparently few have been taken up. The stocks accumulated by consumers had been largely reduced, but some remained and these are now being eaten into rapidly. The circular price remains $1.50. For prompt coal, based on transactions to date, we quote: Slack, $1.50; mine-run, $1.60@1.75; ¾-in., $1.60@1.75; 1¼-in., $1.70@1.85 per net ton at mine, Pittsburgh district.

BUFFALO

Bituminous quiet. Slack stronger than sizes. Strikes have steadied up the market. Shippers in doubt as to future. Anthracite quiet.

Bituminous—There is a fairly large volume of contract business and in some cases shippers find it difficult to get coal enough to meet the demand, on account of the strikes. It is agreed that single orders are scarce, but this may be on account of heavy contracting .There has been no complaint of late that coal is coming in unsold.

The situation is very much mixed. The Canadian trade is generally quiet, although there are a good many shippers looking to the St. Lawrence River demand as an offset to the general slackness in Canada. Shipments to Sodus and from Lake Erie ports to eastern Canada are larger than formerly. Sodus is quite over-loaded with coal and it looks as if there would be a weakening of the market in that direction unless the shipments drop off.

So many miners are on strike everywhere that it is impossible to forecast trade conditions. A great part of the Pittsburg and West Penn miners are out. The latter have been on strike so long that they have scattered badly and may not come back at all. There are also strikes in the Allegheny Valley, but they are more scattered and do not generally last long.

Prices are fairly strong and promise to continue, as follows:

	Pittsburgh	Allegheny Valley	Penn Smokeless
Lump	$2.95	$2.75	$2.80
Three-quarter	2.85	2.60	.....
Mine run	2.75	2.50	2.60
Slack	2.40	2.30	2.60

Prices are per net ton, except east of Rochester and Kingston, Ont., where they are per gross ton.

Anthracite—The demand has improved since the appearance of May prices, although it is not likely that the loss of tonnage occasioned by the delay in announcing prices will be made up this spring. The consumer will lay in a supply of egg for furnace use and omit his chestnut purchases till fall. The delay has badly complicated the business of shipping agents, as none of them knew what to do till the prices appeared.

Shipments of anthracite by Lake are much lighter than usual and they will continue so for a while, as one company is sending a great part of its coal to Erie, Penn., on account of lack of loading facilities here. This will continue till fall and will seriously affect the Lake movement here for the season.

The local anthracite trade is fair. There is lack of prices for small sizes, but these were made up unofficially, so that the schedule was kept complete.

Lake shipments for the week were 66,500 net tons divided as follows: 26,500 tons to Duluth and Superior, 10,500 tons to Manitowoc, 7,200 tons to Fort William, 5,500 tons to Waukegan, 3,800 to Hubbell, 3,500 tons to Racine, 3,400 tons to Houghton, 3,300 tons to Hancock, 2,000 tons to Sault Ste. Marie, Can., and 800 tons to Kewaunee.

TORONTO, CAN.

Market in all lines quiet. Yards well stocked. Labor shortage retards local deliveries. Increased prices discounted in advance.

The coal trade is quiet in all lines with plentiful supplies on hand and shipments coming in freely. Manufacturers have generally laid in a sufficient supply for immediate requirements and the market may continue dull for some time. Retail deliveries are frequently considerably delayed by the shortage of labor. The rise in the price of anthracite at the mines does not affect the local market as was anticipated by the trade and the winter prices are maintained. Prices for best grades per short ton are as follows: Retail, anthracite egg, stove and nut, $8; grate, $7.75; pea, $6.75; bituminous, steam, $5.25; screenings, $4.50; domestic lump, $6; cannel, $8. Wholesale f.o.b. cars at destination bituminous three-quarter lump, $4; screenings, $3.25; Pennsylvania smokeless lump, $4.50; Pocahontas Lump, $5.50; slack, $3.75.

TOLEDO

The records at the customs office show that 361,919 tons of coal cleared from this port during April and May of which 189,688 tons represented domestic shipments, and 172,231 foreign shipments. Of these there were 147,984 shipped in American vessels and 24,247 in British vessels, bound for Canadian ports. The largest coal cargo taken from this port in several years was loaded at the Hocking Docks, recently, when the new steel steamer "H. V. Dalton," cleared with 13,019 tons for Lake Superior delivery.

COLUMBUS

Trade fairly active with a good demand for Lake tonnage the feature. Steam coal also moving well. Domestic trade quiet.

General steadiness has characterized the trade during the past week. There has been a fair demand for steam tonnage and prices have been well maintained. Lake trade is also good and the tone of the market is satisfactory while prospects for the future are good.

Domestic business is quiet, as is usual this time of the year. Some buying of Pocahontas is reported and prices are strong at the full May circular. Not much stocking of Hocking lump is reported but the movement is expected to start earlier than usual. Dealers have been devoting their attention to cleaning up preparatory to the stocking season.

Manufacturing establishments are buying well and the same is true of railroads. Contracting is progressing and prices are considerably higher than a year ago. Surplus stocks, accumulated prior to the expiration of the wage agreement have been generally used up. Buying in the open market is now the rule. Car shortage is affecting operations in many of the districts of the state, especially in eastern Ohio.

Lake boats are now more regular and the movement to the head of the Lakes is steady. The dock situation at the upper Lake ports is good and the movement to the interior is active. Lake shippers are making every effort to get a large tonnage shipped.

One of the worst features of the trade is the shortage of labor. This is felt not only at the mines but also at other points. Dealers are having trouble getting labor for the unloading of cars. Operators are trying to remedy the shortage but there is no relief in sight.

	Hocking	Pomeroy	East Ohio		Hocking	Pomeroy	East Ohio
Re-screened lump..	$1.60	$1.70	.....	Egg	$1.30	$1.35	....
Inch and a quarter.	1.50	1.50	$1.40	Mine-run	1.20	1.20	$1.15
Three-quarter-inch	1.40	1.40	1.30	Nut, pea and slack.	.90	.90	.85
Nut	1.30	1.30	.....	Coarse slack	.80	.80	.75

DETROIT

Small sizes are the strongest feature of the market. Inquiries for domestic coal improve. Lake shippers find boat owners indifferent to contracts.

Bituminous—Three-quarter lump interests a few buyers and slack is finding a somewhat limited sale. Nut, pea and slack are in best demand and the price varies from 80 to 90c. More frequent inquiries for domestic coal are noted. There is considerable speculative coal coming to Detroit, but the situation is much better as regards coal on tracks, than was the case before the Lake trade opened.

Anthracite—Winter prices on prepared sizes of anthracite will be maintained until Oct. 1, when an advance of 50c. a ton on egg, stove and chestnut is scheduled to become operative. Buying is not active, though some of the retailers are placing small orders. Shipment is still handicapped by freight congestion in the east.

Lake Trade—Efforts of coal shippers to obtain vessels for ports on Lake Michigan are only in a small degree successful; vessel owners are reluctant to send boats to ports where no cargo for the return trip is available. There is a heavy

movement of coal to ports on Lake Superior, but unless the coal is ready for immediate loading, owners refuse to hold their boats. Freight rates on iron ore were advanced to $1, last week, the highest rate since 1899 and this is drawing most of the boats to the ore trade that were not previously under contract.

CINCINNATI

Market somewhat restricted. Prices firm at a fairly high level.

Supply and demand continue on a limited basis in this market, due to the trouble in getting enough men and cars and to the comparative indifference of buyers. While few are now of the opinion that it will be possible to get coal cheaper later on, the coming of warm weather has made it easy to postpone buying while limited supplies have caused wholesalers to refrain from pressing for business. Contracts for the most part have been closed at good prices, while those consumers who let the early contracting season go by are now depending on spot coal for their requirements. The Lake movement is taking a fair quota of coal, but an occasional difficulty in finding bottoms now and then throws some cheap coal on this market for the bargain hunters.

LOUISVILLE

Conditions generally satisfactory. Car shortage again evident and labor continues scarce.

The market continues satisfactory. The car shortage is again making itself felt, but this is improving the tone of the market. In the Western Kentucky field no changes in price have been made yet as a result of the strike. If a settlement is reached in reasonable time the disagreement will not materially affect the situation.

Prices up to the last of May showed no material change.

COKE

CONNELLSVILLE

Furnace coke market stronger, apparently on account of Pittsburgh district coal strike. Prompt foundry coke easier. Production and shipments substantially unchanged.

The furnace coke market has visibly stiffened. There are reports that $1.75 were obtained for spot, Friday and Saturday of last week, but this week while the market is strong there are sellers at $1.50 but not at less. Thus there is represented an advance of about 25c. since last report. Inasmuch as there have been two or three suspensions of shipments on contract the stiffness in the market is to be attributed to the demand for raw coal, chiefly expected rather than already realized, from the Klondike region on account of the strike affecting about 75% of the union mining capacity in the Pittsburgh coal district. The most important suspension has been in connection with the strike at the two Cleveland blast furnaces of the River Furnace Co.

While there has been much talk of curtailing the merchant coke production to adjust it closely to the requirements on contracts and thus avoid the offering of prompt coal at cut prices, the restriction does not seem to have amounted to anything tangible thus far. Operators are making an effort to avoid losing production this week on account of Memorial Day but some sort of a scarcity may be developed by the end of the week. There are no negotiations for contract furnace coke. Spot foundry coke has continued to weaken, as it was left too high proportionately by the recent decline in furnace coke, and it is quotable 25c. lower this week. We quote: Prompt furnace, $2.50@2.75; contract, nominal, $2.50@3; prompt foundry, $3.25@3.50; contract, $3.50, per net ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended May 20 at 434,441 tons, a decrease of 6,237 tons, and shipments at 434,190 tons, a decrease of 5,887 tons.

Buffalo—There is still too much coke for the demand, so that the ovens have made a further reduction to $5 for best Connellsville foundry, $4.45 for furnace, $3.50 for high sulphur and $3.35 for stock. Consumption continues fair.

Baltimore—The coke market showed less strength. The fact is becoming more and more patent to the trade that the large byproduct plants, with constantly increasing production, are cutting into the coke trade.

Chicago—The movement of coke is brisk, the demand being in excess of production. A large tonnage of domestic sizes is being stored in retail yards. Prices are approximately on the same level of last week, being as follows, per net ton f.o.b. cars Chicago: Connellsville, $6@6.25; Wise County, $6.25; byproduct foundry, $6.25@6.50; byproduct domestic, $4.60@4.70; gas house, $4.50@4.60.

MIDDLE WESTERN

GENERAL REVIEW

Prices of all grades firm. Fine coal still stronger. Anthracite. Demand moderate. Position of Eastern grades improved.

On the whole the Western coal markets have gained strength during the past week. The demand is holding up well for this time of year, especially for steam sizes. Stocks accumulated by steam consumers, particularly railroads and large industrial plants, are now being reduced more rapidly, and this has a tendency to strengthen steam coal prices. Screenings are stronger than last week because large consumers have absorbed their storage piles and have come into the open market for considerable tonnage. But little consignment coal is reported at Western trade centers, and Kentucky production, which is usually the worst offender in this respect, inclines more toward steadiness than for some time past.

Anthracite is sluggish being still affected by price uncertainties. Both wholesalers and retailers are maintaining quotations on the winter basis. Some Western anthracite representatives have issued circular prices, but others have not announced their position. Dealers will probably place orders more slowly than usual this summer for their anthracite requirements.

Shipments to the Lakes of Eastern bituminous coals have had a steadying effect on all-rail quotations in the Western market. Shipments of domestic sizes from Illinois mines to Northwestern points are unusually heavy because of higher prices quoted by docks on Eastern coals, including anthracite, largely due to increased water-carrying charges, and increased buying by retailers of that section owing to low temperatures . Unless the movement to the upper Lake ports improves the docks will be short of Eastern tonnage, and this will help the movement of coal from Indiana and Illinois into the Northwest this year Lake shipments have fallen behind in May because of a lack of bottoms and inclement weather. Already a tendency is noted toward increased shipments of Western mines to Wisconsin, Minnesota and the Dakotas.

CHICAGO

Increased buying of large consumers steadies up the screenings market. Smokeless shows further strength. Western domestic sizes firm.

It is understood that the Franklin County operators quote prices for June shipment on the following basis:

Lump, 6-in.	$1.55	2-in. screenings	$0.90@1.00
Egg, 6x3-in.	1.55	1½-in. screenings	.85@1.00
No. 1 nut, 3x2-in.	1.55	¾-in. screenings	.80@ .95
No. 2 nut, 2x1⅝-in.	1.45	No. 5, ½-in. and less	.75
No. 3 chestnut	1.30	Mine-run	1.25@1.35
No. 4 pea	1.30		

Another change to higher prices is scheduled for the month of July, but exact prices for July shipment are not definitely stated at this time. The mines this week have run about half time, with a better demand for domestic lump and egg at circular prices. Open shipments of screenings are steadily held at $1 per ton. Less domestic coal is moving from Saline and Williamson County mines, but steam sizes are in brisk demand.

Springfield screenings have shown an advance of 10c. per ton over last week. But little domestic coal is moving from this district.

The demand for screenings is the principal feature at Indiana mines, the demand being in excess of production, and it is expected that prices for fine coal will show a higher range shortly. The hot weather has reduced the demand for domestic sizes.

Smokeless coals are now in fair shape, and some shippers are insisting upon the full circular price of $1.35 on mine-run. No mine run is being marketed at less than $1.25. Lump and egg are still sluggish, with a few concessions here and there for off grades. Pennsylvania smokeless shipments are limited, and most of this coal is moving via the Lakes. Splint is in fair demand.

A mixed situation exists on the Kentucky coals. On one hand excessive accumulations have been sacrificed at low figures, while on the other hand prices on Millers Creek grades have been withdrawn.

No storage buying of anthracite of any consequence has occurred as yet, and immediate ordering is very slow. Dealers will probably place orders more slowly than usual this summer.

Quotations in the Chicago market are as follows, per net ton f.o.b. cars mines:

	Williamson and Franklin Co.	Springfield	Carterville	Clinton	Knox and Greene Cos.
Lump	$1.35@1.45	$1.45@1.50	$1.40@1.50	$1.40@1.50	$1.50
Steam lump	1.35	1.25@1.35	....	1.30@1.35	1.30
2½ and 3-in. lump	....	....	....	....	....
1¼-in. lump	....	....	....	....	....
Egg	1.35@1.45	1.20@1.25	1.40@1 45	1.40@1.50	1.40@1.50
Nut	....	1.20@1.25	....	1.35@1.45	1.25@1.35
No.1washed	1.40@1.50	....	1.35@1.50	....	....
No.2washed	1.35@1.40	....	(5) 1.90@2.00	....	....
No. 1 nut	1.45	....	....	....	....
No. 2 nut	1.35	....	....	....	....
Mine-run	1.25	1.10@1.15	1.20@1.25	1.10@1.15	1.15
Screenings	.95@1 00	.90@ .95	.95@1.00	.90@ .95	1.00@1 05

	Harrisburg & Saline Co.	E. Kentucky	Pocah. & W.Va.Smok'l.	Penna. Smokeless	Hocking
Lump	$1.35@1 45	$1.25@1.85	$1.50@1.75	$1.50@1.60	$1.65@1.75
1¼-in. lump	1.30@1.35	....	....	....	1.40@1.50
Egg	1.35@1.45	1.15@1.50	1.50@1.70	1.40@1.60	....
Nut	....	1.05@1.35	1.45	1.25@1.40	....
No. 1 nut	1.35@1.45	....	....	....	....
No. 2 nut	1.35	....	....	....	....
Mine-run	1.25	1.20@1.25	1.25@1.35	1.20@1.35	1.25
Screenings	.95@1.00	.85@ .95	....	....	....

ST. LOUIS

The dealer demand is over and the demand for steam coal is very light. Lump coal is a drug on the market, and even screenings are quiet. Unbilled lump coal is on the sidings at all the mines. In the Standard District lump coal has been offered at 75c., a lower price than ever before. It is true that last summer prices hit the same low mark, but there has been an advance in the mining rate of from 7c. to 10c. a ton since that time which makes price relatively lower.

Contract business has been the only activity of the past week. Some of the companies were planning to withdraw all contract figures by the first of June and this necessarily tended to hasten trade somewhat. Toward the end of the week orders for future delivery came in with gratifying regularity.

Mines in the Standard district are operating about two days a week, and Franklin County the same.

The anthracite situation has apparently been settled. Prices as originally announced have been confirmed but it has been stated that these are only guaranteed for the month of May. The new prices do not take care of the freight advance made last August.

	Franklin County	Williamson County	Staunton and Montgomery Counties	Intermediate	Standard
6-in. lump	$1.45	$1.25@1.45	$1.25@1.40	$1.15@1.25	$1.00
6x3-in. egg	1.45	1.25@1.45	1.25@1.40	1.15@1.25	1.00
3x2-in. nut	1.45	1.25@1.45	1.25@1.40	1.15@1.25	1.00
No. 2 nut	1.40	1.10	1.10	.....	.95
No. 3&4	1.30	.....	.....	.....	....
Screening	1.00	.95	.85	.....	.80
2-in. lump	.....	.....	1.15@1.25	1.10	.85
Steam egg	.....	.....	.....	.....	.85
Mine run	1.25	1.10	1.10	1.00	.80
Washed					
No. 1 nut	.....	1.50	1.40	1.40	1.40
No. 2 nut	.....	1.35	1.25	1.25	1.25
No. 3 nut	.....	1.30	1.20	1.20	1.20
No. 4 pea	.....	1.25	1.15	1.15	1.15
No. 5 slack	.....	.80	.80	.80	.80

KANSAS CITY

Possibility of labor trouble stimulating buying and the market is steady.

Steam coal is still scarce and in good demand. Prices are very firm at practically the same level as for the past months. Some uneasiness is felt because of a probable break between the miners and the operators and many firms are storing coal. Little trouble is reported as yet at most mines, but those in Central Kansas are having difficulties. Slack coal brings from $1.45 to $1.50; mill, $1.65 to $1.70; lump and nut, $2.25 up; and nut run, $1.73.

PRODUCTION AND TRANSPORTATION STATISTICS

SOUTHWESTERN TONNAGE

The following is a comparative statement of the Southwestern tonnage for November and December of 1914 and 1915 and February of 1915 and 1916 in short tons:

	November		December		February	
State	1914	1915	1914	1915	1915	1916
Missouri	252,105	276,728	285,547	267,715	225,996	289,564
Kansas	591,383	611,877	643,213	634,223	492,320	612,453
Arkansas	141,554	174,867	123,737	111,003	102,451	130,690
Oklahoma	332,515	287,418	352,267	306,282	302,026	276,907
	1,317,557	1,350,890	1,404,764	1,319,223	1,122,793	1,309,614

PENNSYLVANIA RAILROAD

The following is a statement of shipments over the P. R.R. Co.'s lines east of Pittsburgh and Erie for April and the four months of 1915 and 1916, in short tons:

	April		Four Months	
	1916	1915	1916	1915
Anthracite	766,540	1,126,690	3,995,058	3,607,419
Bituminous	3,879,270	3,358,062	16,598,440	13,203,746
Coke	1,254,412	832,427	4,932,751	3,136,262
Total	5,900,222	5,317,179	25,526,249	19,947,427

EXPORTS

Exports of domestic coal and coke from the United States, and bunker coal laden on vessels engaged in the foreign trade, at the specified districts during the month of March, 1916, were as follows:

Districts	Anthracite	Bituminous	Coke
Maine and New Hampshire	120	264	....
Vermont	734	2,028	....
Massachusetts	33	1	....
St. Lawrence	84,263	80,804	2,044
Rochester	2,496	38,181	596
Buffalo	205,097	322,219	44,032
New York	8,231	2,193	2,177
Philadelphia	7,175	64,522	3,520
Maryland	....	56,072	3,296
Virginia	....	375,307	3,203
South Carolina	....	7,324	....
Florida	6	591	....
Mobile	....	100	....
New Orleans	10	641	84
Laredo	233	3,023	1,943
El Paso	121	5,776	1,657
Eagle Pass	....	1,036	558
Arizona	....	5,596	12,307
Southern California	....	120	....
San Francisco	2	1	1,789
Washington	29	1,925	3,884
Alaska	....	2	....
Dakota	1,288	3,454	239
Duluth and Superior	....	9,887	167
Michigan	117	87,791	12,482
Porto Rico	....	350	....
Total	309,955	1,069,218	93,980

Bunker Coal—	Gross Tons
Maryland	38,775
New York	277,234
Philadelphia	34,984
Virginia	125,828

NORFOLK & WESTERN RY.

The following is a statement of coal handled by the N. & W. Ry. during April and the preceding three months in short tons:

	January	February	March	April
Pocahontas Field	1,487,189	1,434,153	1,506,671	1,442,497
Tug River District	343,516	333,102	338,232	343,854
Thacker District	284,135	254,953	276,308	258,659
Kenova District	89,459	83,218	88,440	74,993
Clinch Valley District	131,242	124,626	137,641	122,155
Other N. & W. Territory	4,547	3,616	5,724	2,963
Total N. & W. Fields	2,340,088	2,233,668	2,353,016	2,245,121
Williamson & Pond Creek	96,436	100,985	104,846	97,547
Tug River & Ky. R.R.	58,045	50,925	54,254	50,125
All other railroads	158,840	168,798	'91	459,279
Grand total	2,653,409	2,554,376	2,.. ,507	2,852,072

BALTIMORE & OHIO

The following is a statement of coal and coke tonnage moved over this system and affiliated lines during April and the previous two months:

	February		March		April	
	1916	1915	1916	1915	1916	1915
Coal	2,666,007	1,906,210	2,763,165	2,094,607	2,510,188	2,159,914
Coke	378,461	232,111	400,518	257,099	355,268	289,369
Total	3,044,468	2,138,321	3,163,683	2,351,706	2,865,456	2,449,283

FOREIGN MARKETS

GREAT BRITAIN

May 17—The general conditions in steam coals are as strong as ever. Supplies are still extremely scarce. Quotations are approximately as follows:

Best Welsh steam	Nominal	Best Monmouthshires	$13.08@13.20
Best seconds	Nominal	Seconds	12.00@12.60
Seconds	$12.96@13.20	Best Cardiff smalls	7.80@ 8.04
Best dry coals	11.52@12.48	Cargo smalls	5.76@ 6.72

The prices for Cardiff coals are f.o.b. Cardiff, Penrath or Barry, while those for Monmouthshire descriptions are f.o.b. Newport, both net, exclusive of wharfage.

Freight—Chartering is again fairly active and rates are approximately as follows:

Gibraltar	$15.00	Naples	$22.80	St. Vincent	$12.00
Marseilles	24.12	Alexandria	27.00	River Plate	14.40
Algiers	....	Port Said	26.40		
Genoa	22.80	Las Palmas	11.40		